

See "Instructions for Filling out the Work Permit" contained in the Work Planning and Control for Experiments and Operations Subject Area.

1. Work request WCC fills out this section.
☐ Standing Work Permit

Requester: Don Lynch	Date: 7/1/2016	Ext.: 2253	Dept/Div/Group: PO/PHENIX
Other Contact person (if different from requester): Carter Biggs			Ext.: 7515
Work Control Coordinator: Don Lynch		Start Date: 7/5/2016	Est. End Date: 12/1/2016
Brief Description of Work: Remove and store existing PHENIX Beampipe sections and Replace with new 5" Beampipe sections and support stands			
Building: 1008 IR	Room: IR	Equipment: Beampipe sections	Service Provider: PHENIX and CAD Engineers and techs

2. WCC, Requester/Designee, Service Provider, and ESSH (as necessary) fill out this section or attach analysis

ESSH ANALYSIS							
Radiation Concerns	<input type="checkbox"/> None	<input checked="" type="checkbox"/> Activation	<input type="checkbox"/> Airborne	<input type="checkbox"/> Contamination	<input type="checkbox"/> Radiation	<input type="checkbox"/> NORM	<input type="checkbox"/> Other
<input type="checkbox"/> Special nuclear materials involved, notify Isotope Special Materials Group				<input type="checkbox"/> Fissionable/Radiological materials involved, notify Laboratory Nuclear Safety Officer			
Radiation Generating Devices:	<input type="checkbox"/> Radiography		<input type="checkbox"/> Moisture Density Gauges	<input type="checkbox"/> Soil Density Gauges		<input type="checkbox"/> X-ray Equipment	
Safety and Security Concerns	<input type="checkbox"/> None	<input type="checkbox"/> Explosives		<input type="checkbox"/> Transport of Haz/Rad Material		<input type="checkbox"/> Pressurized Systems	
<input type="checkbox"/> Adding/Removing Walls or Roofs	<input type="checkbox"/> Critical Lift	<input type="checkbox"/> Fumes/Mist/Dust*		<input type="checkbox"/> Magnetic Fields*		<input type="checkbox"/> Railroad Work	
<input type="checkbox"/> Asbestos*	<input type="checkbox"/> Cryogenic	<input type="checkbox"/> Heat/Cold Stress		<input type="checkbox"/> Nanomaterials/particles*		<input checked="" type="checkbox"/> Rigging	
<input checked="" type="checkbox"/> Beryllium*	<input type="checkbox"/> Electrical	<input type="checkbox"/> Hydraulic		<input type="checkbox"/> Noise*		<input type="checkbox"/> Silica*	
<input type="checkbox"/> Biohazard*	<input checked="" type="checkbox"/> Elevated Work	<input type="checkbox"/> Lasers*		<input type="checkbox"/> Non-ionizing Radiation*		<input type="checkbox"/> Security Concerns	
<input type="checkbox"/> Chemicals/Corrosives*	<input type="checkbox"/> Excavation	<input type="checkbox"/> Lead*		<input type="checkbox"/> Oxygen Deficiency*		<input type="checkbox"/> Suspect/Counterfeit Items	
<input type="checkbox"/> Confined Space*	<input type="checkbox"/> Ergonomics*	<input type="checkbox"/> Material Handling		<input type="checkbox"/> Penetrating Fire Walls		<input checked="" type="checkbox"/> Vacuum	
Ladder Access Required: <input checked="" type="checkbox"/> Portable Ladder <input type="checkbox"/> Fixed Ladder- Status/Restrictions:							
* Safety Health Rep. Review Required		<input type="checkbox"/> Haz, Rad, Bio Material Exceed DOE 151.1-C Levels - Contact OEM				<input type="checkbox"/> Other	
Environmental Concerns			<input checked="" type="checkbox"/> None		<input type="checkbox"/> Work impacts Environmental Permit No.		
<input type="checkbox"/> Atmospheric Discharges (rad/non-rad/GHG)		<input type="checkbox"/> Land Use Institutional Controls		<input type="checkbox"/> Soil Activation/contamination		<input type="checkbox"/> Waste-Mixed	
<input type="checkbox"/> Chemical or Rad Material Storage or Use		<input type="checkbox"/> Liquid Discharges		<input type="checkbox"/> Waste-Clean		<input type="checkbox"/> Waste-Radioactive	
<input type="checkbox"/> Cesspools (UIC)		<input type="checkbox"/> PCB Management		<input type="checkbox"/> Waste-Hazardous		<input type="checkbox"/> Waste-Regulated Medical	
<input type="checkbox"/> High water/power consumption		<input type="checkbox"/> Spill potential		<input type="checkbox"/> Waste-Industrial		<input type="checkbox"/> Historical Environmental Hazards	
Waste disposition by: <input type="checkbox"/> Other							
Pollution Prevention (P2)/Waste Minimization Opportunity: <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes				Environmental Preferable Products Available: <input type="checkbox"/> No <input type="checkbox"/> Yes			
FACILITY CONCERNS		<input checked="" type="checkbox"/> None		<input type="checkbox"/> Intermittent Energy Release			
<input type="checkbox"/> Access/Egress Limitations		<input type="checkbox"/> Electrical Noise		<input type="checkbox"/> Potential to Cause a False Alarm		<input type="checkbox"/> Vibrations	
<input type="checkbox"/> Credited Controls (Use USI Process)		<input type="checkbox"/> Impacts Facility Use Agreement		<input type="checkbox"/> Temperature Change		<input type="checkbox"/> Other	
<input type="checkbox"/> Configuration Management		<input type="checkbox"/> Maintenance Work on Ventilation Systems		<input type="checkbox"/> Utility Interruptions			
WORK CONTROLS							
Work Practices							
<input type="checkbox"/> None		<input type="checkbox"/> Exhaust Ventilation		<input checked="" type="checkbox"/> Lockout/Tagout		<input type="checkbox"/> Spill Containment	
<input checked="" type="checkbox"/> Back-up Person/Watch		<input type="checkbox"/> HP Coverage		<input type="checkbox"/> Posting/Warning Signs		<input type="checkbox"/> Time Limitation	
<input type="checkbox"/> Barricades		<input type="checkbox"/> IH Survey		<input checked="" type="checkbox"/> Scaffolding-requires inspection		<input type="checkbox"/> Warning Alarm (i.e. "high level")	
						<input type="checkbox"/> Electrical Inspection Required	
Personal Protective Equipment							
<input type="checkbox"/> None		<input type="checkbox"/> Ear Plugs		<input checked="" type="checkbox"/> Gloves, as necessary		<input type="checkbox"/> Lab Coat	
<input type="checkbox"/> Coveralls		<input type="checkbox"/> Ear Muffs		<input type="checkbox"/> Goggles		<input type="checkbox"/> Respirator*	
<input type="checkbox"/> Disposable Clothing		<input type="checkbox"/> Face Shield		<input type="checkbox"/> Hard Hat		<input checked="" type="checkbox"/> Safety Shoes, as req'd	
						<input type="checkbox"/> High visibility cloths/vest	
						<input type="checkbox"/> Other	
Permits Required (Permits must be valid when job is scheduled.)							
<input checked="" type="checkbox"/> None		<input type="checkbox"/> Cutting/Welding		<input type="checkbox"/> Impair Fire Protection Systems			
<input type="checkbox"/> Concrete/Masonry Penetration		<input type="checkbox"/> Digging/Core Drilling		<input type="checkbox"/> Rad Work Permit-RWP No			
<input type="checkbox"/> Confined Space Entry		<input type="checkbox"/> Electrical Working Hot		<input type="checkbox"/> Other Confined Space 2A certification			
Dosimetry/Monitoring							
<input checked="" type="checkbox"/> None		<input type="checkbox"/> Heat Stress Monitor		<input type="checkbox"/> Real Time Monitor		<input type="checkbox"/> TLD	
<input type="checkbox"/> Air Effluent		<input type="checkbox"/> Noise Survey/Dosimeter		<input type="checkbox"/> Self-reading Pencil Dosimeter		<input type="checkbox"/> Waste Characterization	
<input type="checkbox"/> Ground Water		<input type="checkbox"/> O ₂ /Combustible Gas		<input type="checkbox"/> Self-reading Digital Dosimeter		<input type="checkbox"/> Other	
<input type="checkbox"/> Liquid Effluent		<input type="checkbox"/> Passive Vapor Monitor		<input type="checkbox"/> Sorbent Tube/Filter Pump			
Training Requirements (List specific training requirements)							
Confined Space, CA -Collider User, PHENIX Awareness, Working at heights, Be Awareness, ladder training							
Work screening has identified the following as the reason for permitted work:				When work is categorized as worker planned work and a permit is used only the following signatures are required: (Although allowed, there is no need to use back of form)			
<input type="checkbox"/> ESSH				WCC: _____ Date: _____			
<input type="checkbox"/> Complexity				Service Provider: _____ Date: _____			
<input checked="" type="checkbox"/> Work Coordination				Authorization to start: _____ Date: _____			
<input type="checkbox"/> Permit Not Required (Sections 3 through 7 optional)				(Department/Division, or their equivalent, Sup/WCC/Designee)			

3. Both work requester and service provider contribute to work plan (use attachments for detailed plans)

Work Plan (procedures, timing, equipment, scheduling, coordination, notifications, and personnel availability need to be addressed in adequate detail): See attached work plan and procedure

Special Working Conditions Required (e.g., Industrial Hygiene hold points or other monitoring)
None

Notifications to operations and Operational Limits Requirements: None

Post Work Testing, Notification or Documentation Required: See Attached Plan

Job Safety Analysis Required: ☐ Yes ☒ No

Review Done: ☒ in series ☐ team

Reviewed by: * Primary Reviewer signature (not required for Worker Planned Work) means that the Review Team members were appropriate for the work that was planned, the Team visited the job site, hazards and risks that could impact ESSH have been considered and controls established according to BNL requirements. In addition, this signature indicates that applicable JRAs, FRAs, as well as other planning documents have been reviewed and training requirements have been identified and recorded on this permit.

Title	Name (print)	Signature	Life #	Date
ES&H Professional				
F&O Facility Project Manager				
Service Provider				
Work Control Coordinator	Don Lynch		20146	
Safety Health Representative				
Research Space Manager				
Other				
Other				
Required Walkdown Completed				
*Primary Reviewer				

4. Job site personnel (Supervisor and workers) fill out this section.

Note: Signature indicates personnel performing work have read and understand the hazards and permit requirements (including any attachments) and all training required for this permit is current/complete. Job Supervisor/Contractor Supervisor signatures also includes verification that worker training required for this permit is current/complete.

Job Supervisor:		Contractor Supervisor:	
Workers:	Life#:	Workers :	Life#:

Workers are encouraged to provide feedback on ESSH concerns or on ideas for improved job work flow. Use feedback form or space below.

5. Department/Division, or their equivalent, Line Manager or Designee

Conditions are appropriate to start work: (Permit has been reviewed, work controls are in place and site is ready for job.)

Name:	Signature:	Life#:	Date:
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6. Worker provides feedback.

Worker Feedback (use attached sheets as necessary)

a) WCM/WCC: Are there any changes as a result of worker feedback? ☐ Yes ☐ No

Note: See Work Planning and Control for Experiments and Operations Subject Area section 2.6.

7. Post Job Review/Closeout: Work Control Coordinator (authorizing dept.) checks quality of completed permit and ensures the work site is left in an acceptable condition. (WCC can delegate clean up of job site to work supervisor.) The WCC ensures that the change process to update drawings, placards, postings, procedures, etc., is initiated, if necessary.

Name:	Signature:	Life#:	Date:
Comments:			

PHENIX BP Removal, Storage for Future Repurposing & Temporary Replacement Procedure**Introduction**

PHENIX has completed its experimental mission and is in the process of being removed and/or repurposed. This involves the removal of all detector subsystems and other components and dispositioning them as appropriate for the future intended use. For the PHENIX Beampipe (“BP”) this will consist of removing all of the PHENIX BP components in the PHENIX IR (between the 5 inch Bellows on the north and south ends) and replacing with a 5inch diameter temporary BP.

The existing PHENIX is comprised of 8 components: (1) 5” dia. straight BP, (2) 5” to 3” dia. BP, (2) 3” to 40 cm dia. BP, and (1) Al/Be BP. All of these sections will be removed and stored by CAD Vacuum Group for future repurposing and its intended reuse in the next generation of PHENIX experiment, known as sPHENIX. A temporary 5” dia. BP (fabricated in multiple sections) will be installed along with appropriate temporary support stands (in place of existing PHENIX components which will be removed and repurposed during this shutdown) to allow the RHIC collider to be used for other experimental runs while the 1008 PHENIX complex is being repurposed for sPHENIX.

Work Plan

This work is to be done by fully trained and experienced personnel (PHENIX and CAD mechanical and vacuum technicians during the 2016 maintenancesummer shutdown.

(Please see the attached Beampipe Installation Plan which accompanies this Work Permit for illustrated descriptions of each of the following steps.)

The work described herein is to be performed by PHENIX technicians unless otherwise indicated. Much of the work described herein will be performed at beam height which will require the use of manlifts, ladders and/or scaffolding to accomplish these tasks. Technicians performing these tasks shall be trained for working at heights, working with portable ladders and shall wear the appropriate fall protection as necessary. In addition, some of the work requires the use of the PHENIX cranes; all PHENIX technicians using cranes shall have appropriate training the specific cranes utilized and rigging training. Technicians working in the square MuID steel hole shall wear a TLD radiation badge and shall have had confined space training. The MuID square hole shall be considered a class 1 confined space.

A. Preparation

1. At the start of the 2016 shutdown, PHENIX technicians will perform the customary tasks associated with the start of a shutdown every year. These include prepping and moving the East Carriage to the Assembly Hall, removing and storing the MuID collars, and installing manlifts, 12 ton cart and floor plates for sturdy working surfaces. As part of the

process CAD vacuum Techs routinely close the north and south vacuum gate valves. *Make sure that CAD vacuum techs have closed the north and south gate valves, isolating the PHENIX beampipe component, and make sure CAD vacuum engineering is aware that the valves need to remain closed until the new beampipe installation is complete.*

The following related tasks will be performed at appropriate times during the beampipe removal phase, as convenient and/or necessary to remove the indicated subsystems prior to disconnecting and/or removing adjacent beampipe sections. The scheduling of these tasks is worker planned work to be determined by the on-site lead technician for the beampipe removal effort.

2. Remove the F_VTX east and west detectors in accordance with work permit # SDD-2016-019
3. Remove the MPC-Ex north and south detectors in accordance with work permit # SDD-2016-011.
4. Remove the MPC north and south detectors in accordance with work permit # SDD-2016-012.
5. Remove the BBC north and south detectors in accordance with work permit # SDD-2016-020.
6. Remove the RPC1 north and south detectors in accordance with work permit # SDD-2016-021.

B. Beampipe De-Installation Procedure.

*Note: The following steps are a general guideline for the removal of the beampipe based on procedures followed in past maintenance shutdowns. The actual work of removing the beampipe is worker planned work done by CAD vacuum techs in cooperation with PHENIX mechanical techs and as such the sequence and specific details of tasks may vary slightly from the following without requiring a revision to this work plan. Venting of the beampipe prior to removal is CAD vacuum group technician work and is performed in accordance with **CAD OPM #8.3.3.***

1. Break Vacuum at Bellows between CM and MMS and between MMS and MuID. (CAD vacuum techs perform this task) Remove the south bellows and place it in a Nitrogen filled bag until needed later with the new beampipe installation.
2. Field assemble temporary supports for south end of Be/SS pipe using unistrut and/or other standard hardware.
3. Move the MMS north.

4. Disassemble the south 5 inch spool at both ends and remove it to the AH for safekeeping. Fill the spool with dry N2 gas and cap both ends.

Note: all beampipe parts that are removed from PHENIX require activation check by BNL Health Physics

5. Pull the south 3-5 transition south out of the MMS and then remove it to the AH for safekeeping. Fill the spool with dry N2 gas and cap both ends.

6. Provide field assembled support for the central Be/Al pipe in the central section of the CM.

7. Move the MMS south then move the CM south.

8. Disconnect the north Bellows. Remove the north bellows and place it in a Nitrogen filled bag until needed later with the new beampipe installation.

9. Field assemble temporary supports for north end of Be/Al pipe using unistrut and/or other standard hardware.

10. Disconnect and remove the north 3 inch to 40 cm transition beampipe and place it in a Nitrogen filled bag until needed later with the new beampipe installation.

11. Move the CM north then field assemble temporary supports for south end of Be/al pipe on the north side of the MMS using unistrut and/or other standard hardware.

12. Disconnect and remove the south 3 inch to 40 cm transition beampipe and place it in a Nitrogen filled bag until needed later with the new beampipe installation.

13. Move the MMS north until the roller supports are aligned with the east-west tracks.

14. Prep the MMS for moving to the assembly hall by disconnecting all cabling and piping to the MMS.

15. Jack up the east side of the MMS and rotate the roller supports 90 degrees to align with the east-west tracks then lower the jack to restore support from the rollers. Do the same for the west side. Move the MMS south into the AH.

16. Pull the central Be/Aluminum beampipe south out of the CM and then remove it to the AH for safekeeping. Fill the beampipe with dry N2 gas and cap both ends.

17. Prep the CM for moving eastward by disconnecting all cables and piping from underneath.

17. Move the CM south until the roller supports align with the east-west tracks. Jack up the east side of the CM and rotate the roller supports 90 degrees to align with the east-west tracks then lower the jack to restore support from the rollers. Do the same for the west side.

18. Move the CM east in the IR until the east rollers are near the sill.

19. Disconnect north 3-5 transition from inside north square hole. Remove the beampipe and its supporting equipment (rollers, bakeout blanket, etc.) by pulling it south out of the MMN and into the area vacated by the CM. Remove it to the AH for safekeeping. Fill the beampipe with dry N₂ gas and cap both ends.

20. Contact CAD vacuum group to take possession of all beampipe components removed in the steps above (except for the north and south bellows). The CAD vacuum group shall maintain these components for future repurposing with the sPHENIX experiment.

Note: during this and the subsequent installation of the new temporary beampipe, there will be several times when temporary support of the various beampipe sections will be required. These supports shall be fabricated by PHENIX technicians from unistrut and soft cushioning material to provide positive support and protection for the relevant beampipe components while they are being positioned for assembly and alignment. This is a worker planned work effort to be accomplished by the PHENIX techs in coordination with the PHENIX work control coordinator and PHENIX engineering.

C. Opportunity for Other PHENIX Removal and Repurposing Tasks

At this point in the R&R process, the existing current beampipe has been completely removed and the PHENIX large magnets and carriages are positioned to begin installation of the temporary beampipe. This is a very convenient configuration, however, to perform R&R. These efforts may continue for a short time before the installation of the new temporary beampipe takes place. These tasks will have their own work permits. Refer to the PHENIX R&R web site for further details about these tasks.

D. Temporary Beampipe Installation Procedure

Refer to PHENIX drawings: 105-0500-114, 105-0500-115, 105-0500-116, 105-0500-117 (beampipe, beampipe stands, fixed support and assembly drawings, respectively) for installation reference information. These drawings do not indicate any internal or external coatings or other preparations. The CAD vacuum group shall be responsible for appropriately preparing these components for UHV service.

1. Prepare the temporary north 5 inch beampipe spool with rolling supports, bakeout heaters, bakeout thermocouples and bakeout insulation ("blankets"). The bakeout equipment shall be installed by CAD vacuum technicians.
2. Install the temporary north 5 inch beampipe spool into the MMN and connect it to the north 5 inch bellows in the north MuID square hole.
3. Place new central area fixed and (2) rolling BP support stands in appropriate locations in the IR on a 1/2 inch aluminum plate (or plates) securely mounted on and bridging the IR rails

in the area directly below the nominal beam path in the IR and in the area directly below the beampipe support positions selected. The center of the 3 support stands is to be the fixed stand.

4. Install the 2 south beampipe sections on the support stands with bakeout heaters, bakeout thermocouples and bakeout insulation ("blankets"). The bakeout equipment shall be installed by CAD vacuum technicians.

5. Attach the south beampipes to each other, the northbeampipe and the south 5 inch bellows. The connection of the conflate flanges should be done by CAD vacuum technicians to assure proper clamping forces and sealing to achieve the required ultra high vacuum.

E. Alignment and Initial Survey & Leak Test

Axial and radial alignment of the temporary sections of the PHENIX beampipe is not critical due to the 5 inch diameter over the entire length (removed sections were 5 inch, 3 inch and 1-5/8 inch in various locations thus requiring precise alignment in the smaller sections).

The radial alignment of the temporary beampipe shall be measured by CAD survey group for to make sure beampipe is properly aligned prior to bakeout. The beampipe should also be leak tested at this time.

F. Bakeout

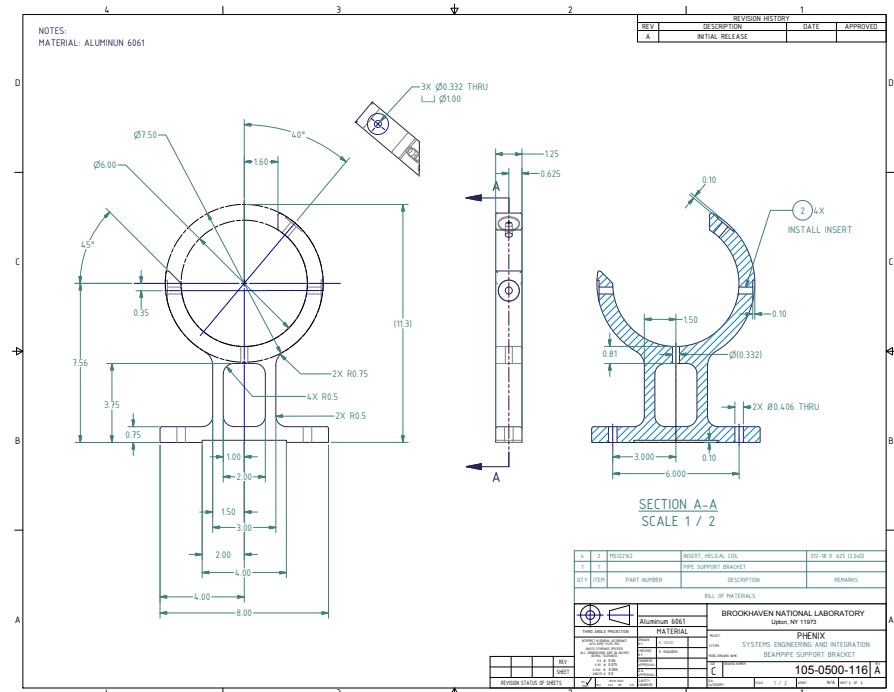
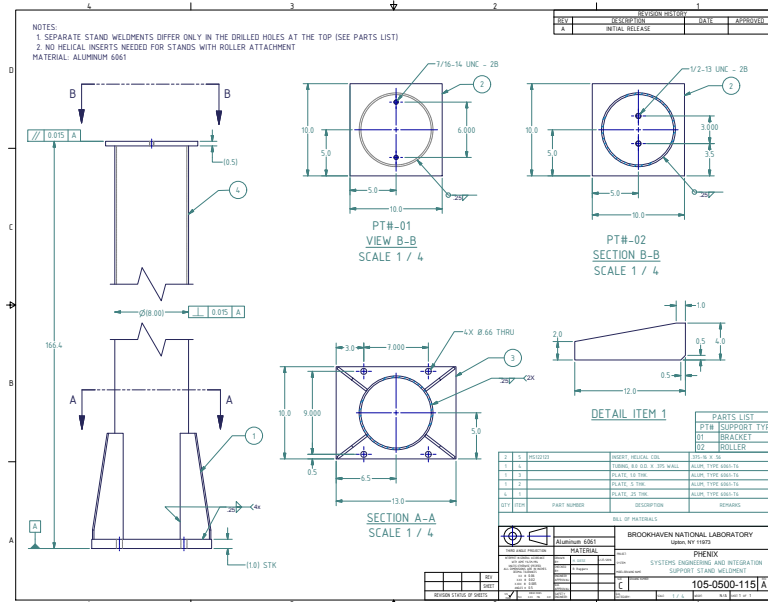
After the new beampipes are all in place connected and pumped down to vacuum, the new sections shall be baked to 250°C (or such other temperature as determined appropriate by CAD group) for a period of time determined by the CAD vacuum group. The CAD vacuum group shall be responsible for work planning of this task. The entire PHENIX beampipe (all sections between the south and north gate valves require bakeout at this time.

G. Leak Test and final survey

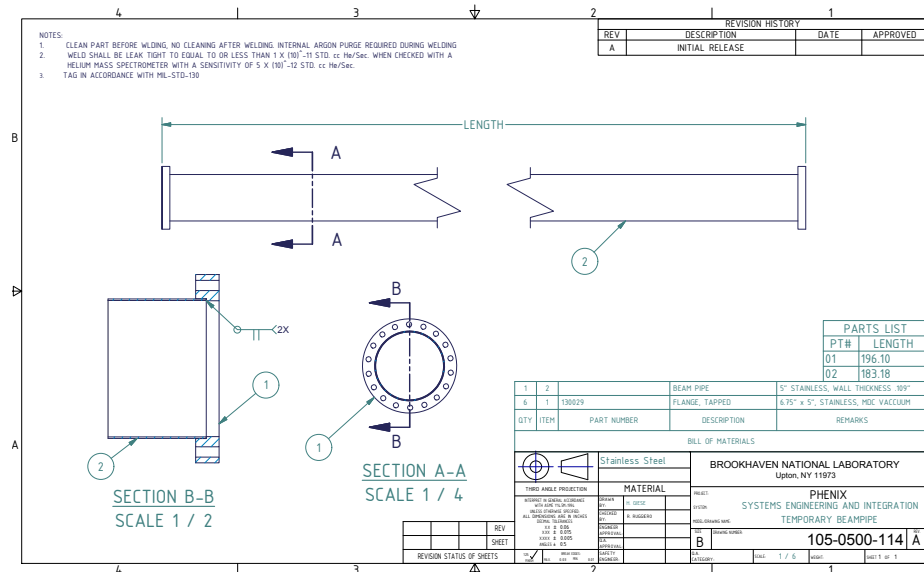
After bakeout the entire new beampipe assembly shall be vacuum leak tested. The CAD vacuum group shall be responsible for work planning of this task. A final survey of the beampipe alignment is also required at this time.

Beampipe Removal Procedure and Related Choreography of Major PHENIX Components

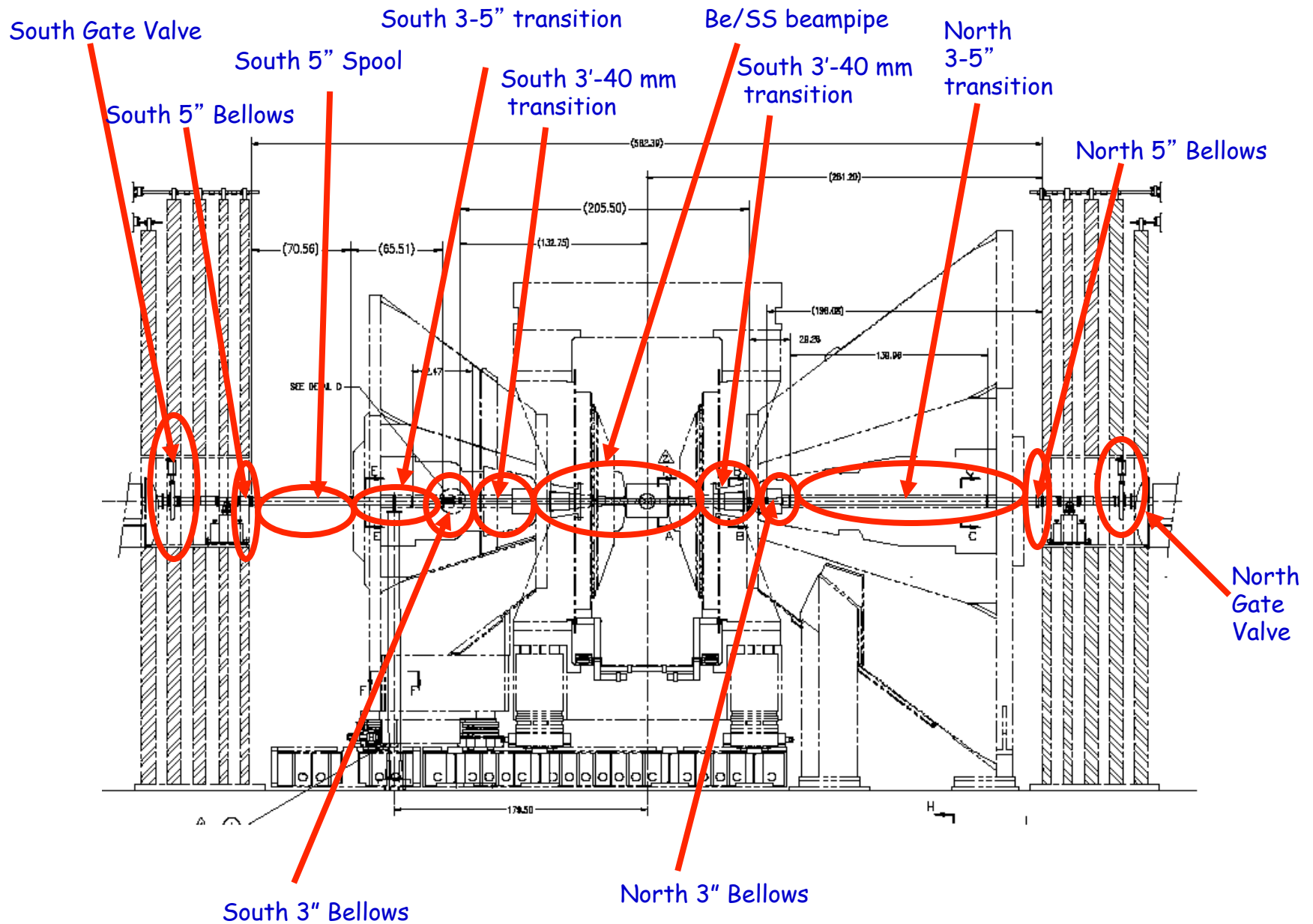
Design



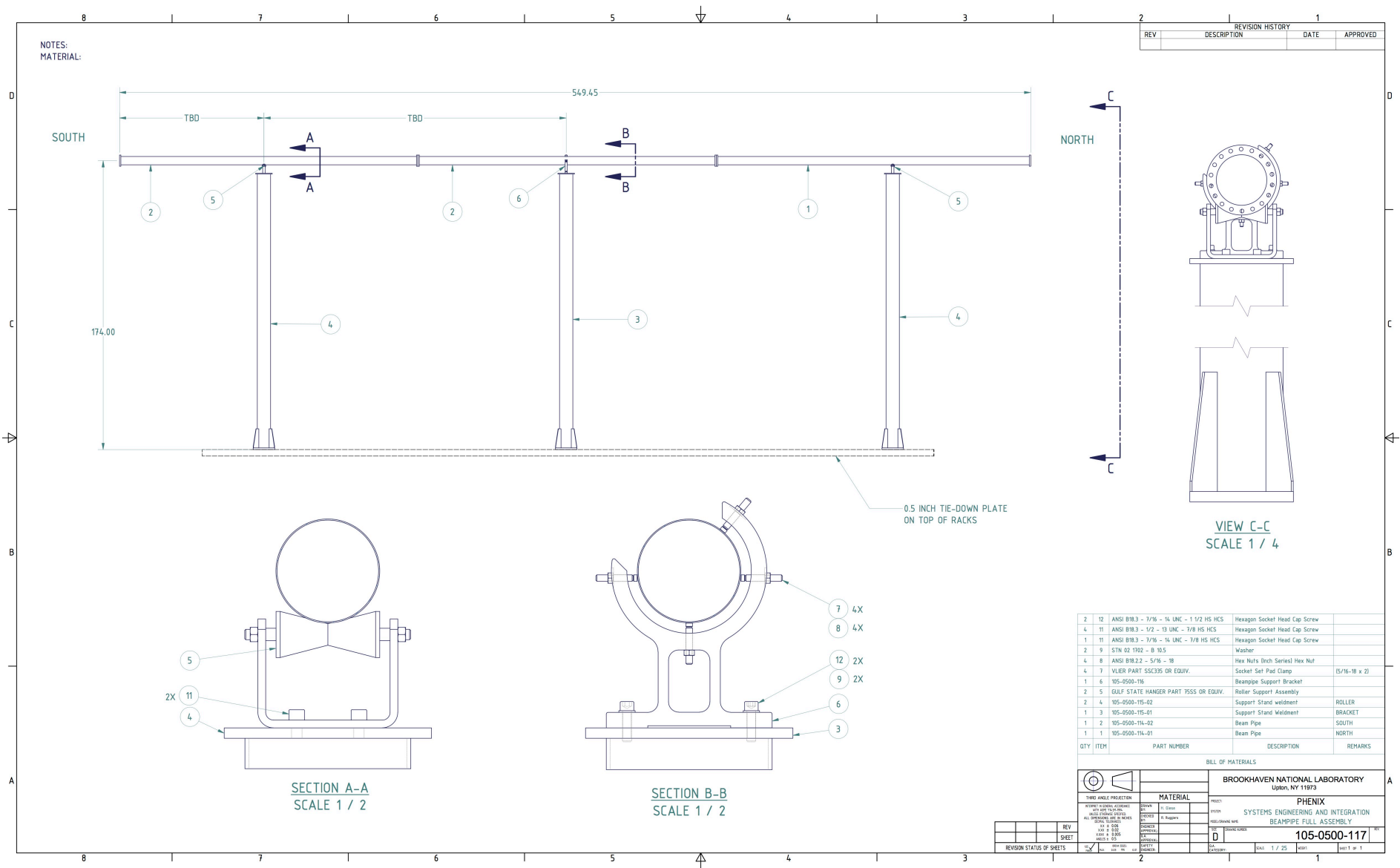
Temporary beampipe and beampipe stands

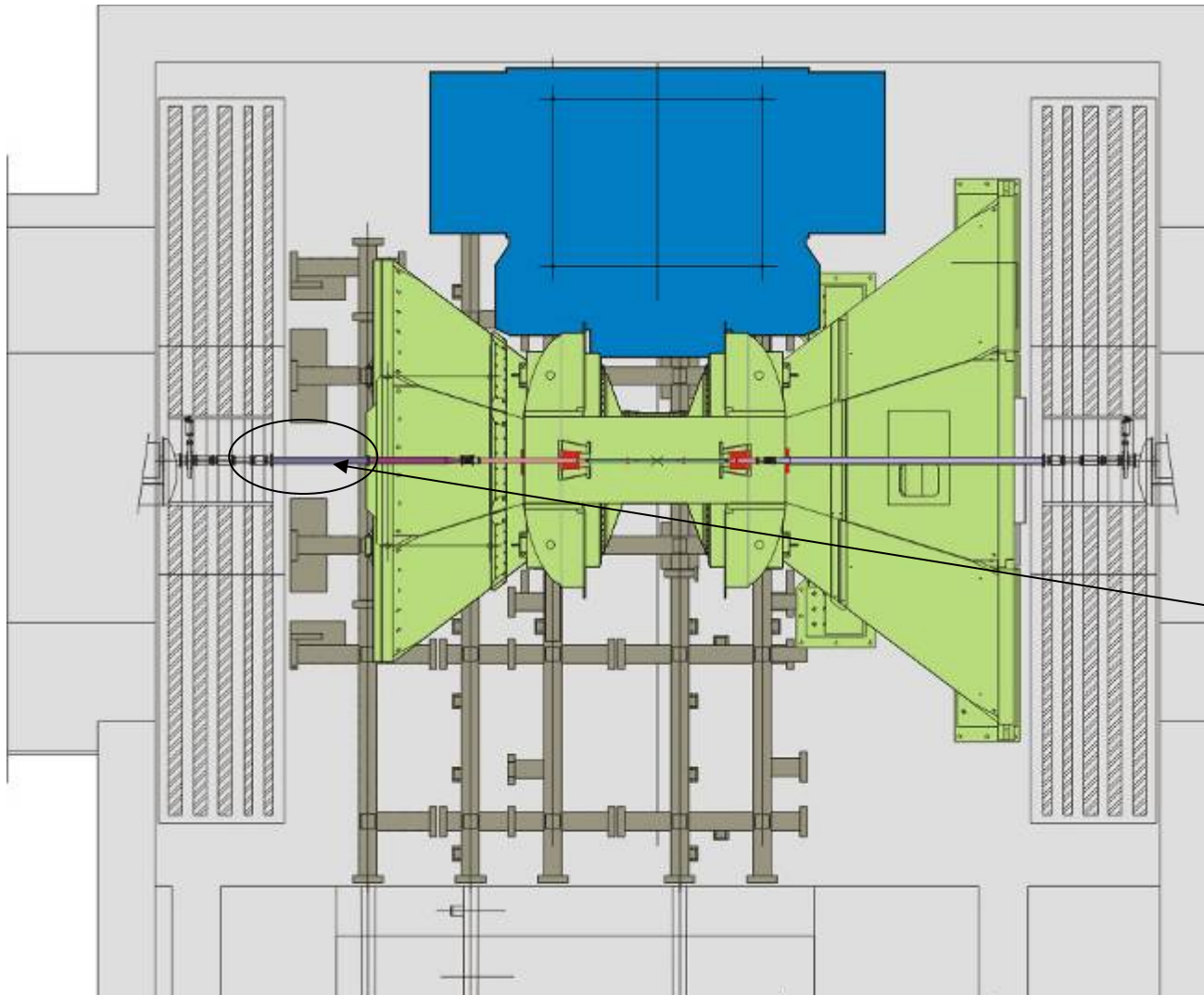


PHENIX Beampipe Configuration during Last Run (2016)



Temporary Beampipe for Run 17

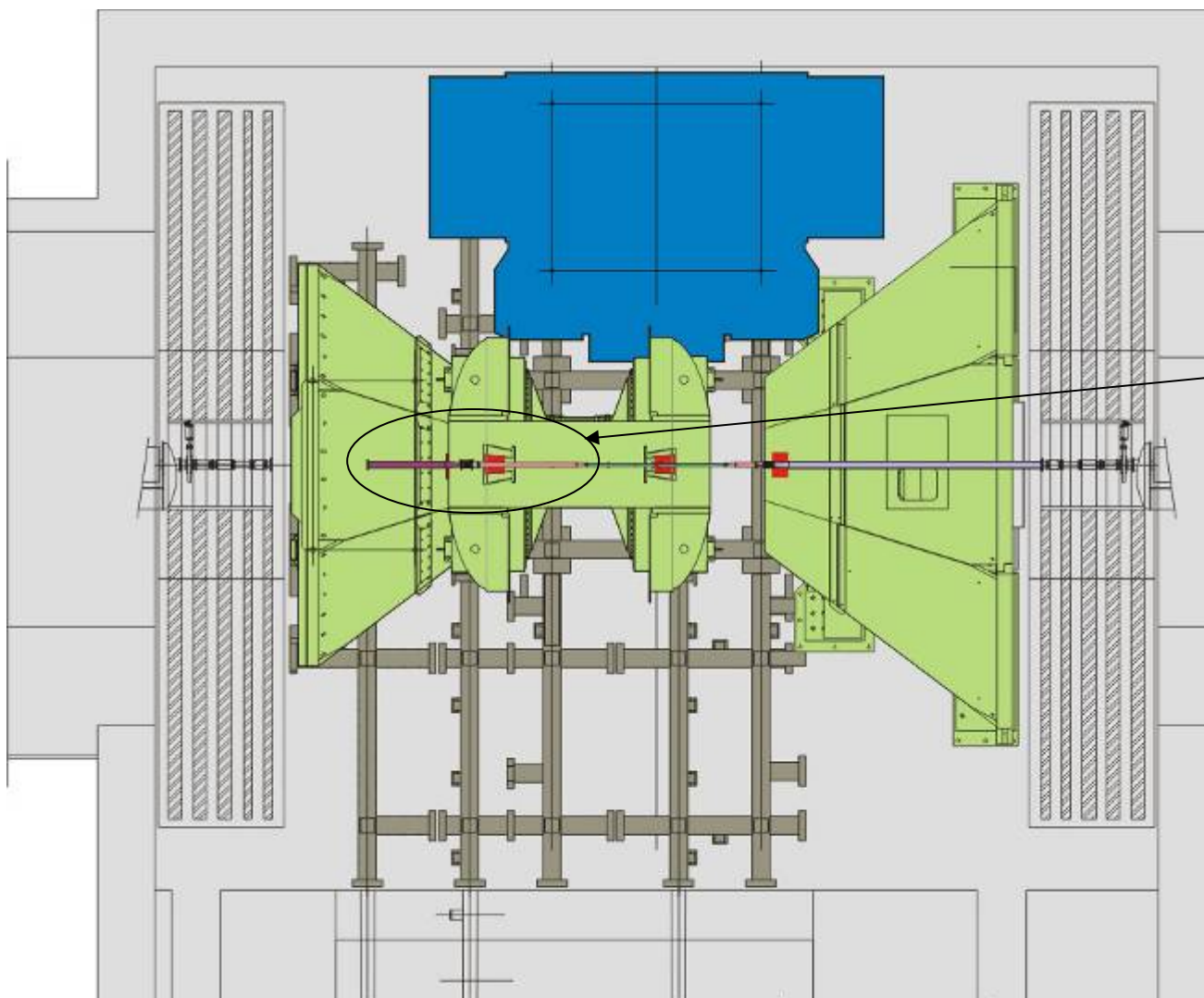




After normal shutdown tasks including removing the MuID collars, moving the EC to the AH and all other shutdown prep activities, we will be ready to remove the existing beampipe. *Before commencing with removal of the existing beampipe sections verify that both north and south PHENIX beampipe gate valves are closed and locked in the closed position until the temporary beampipe has been installed and Run 17 is ready to commence.*

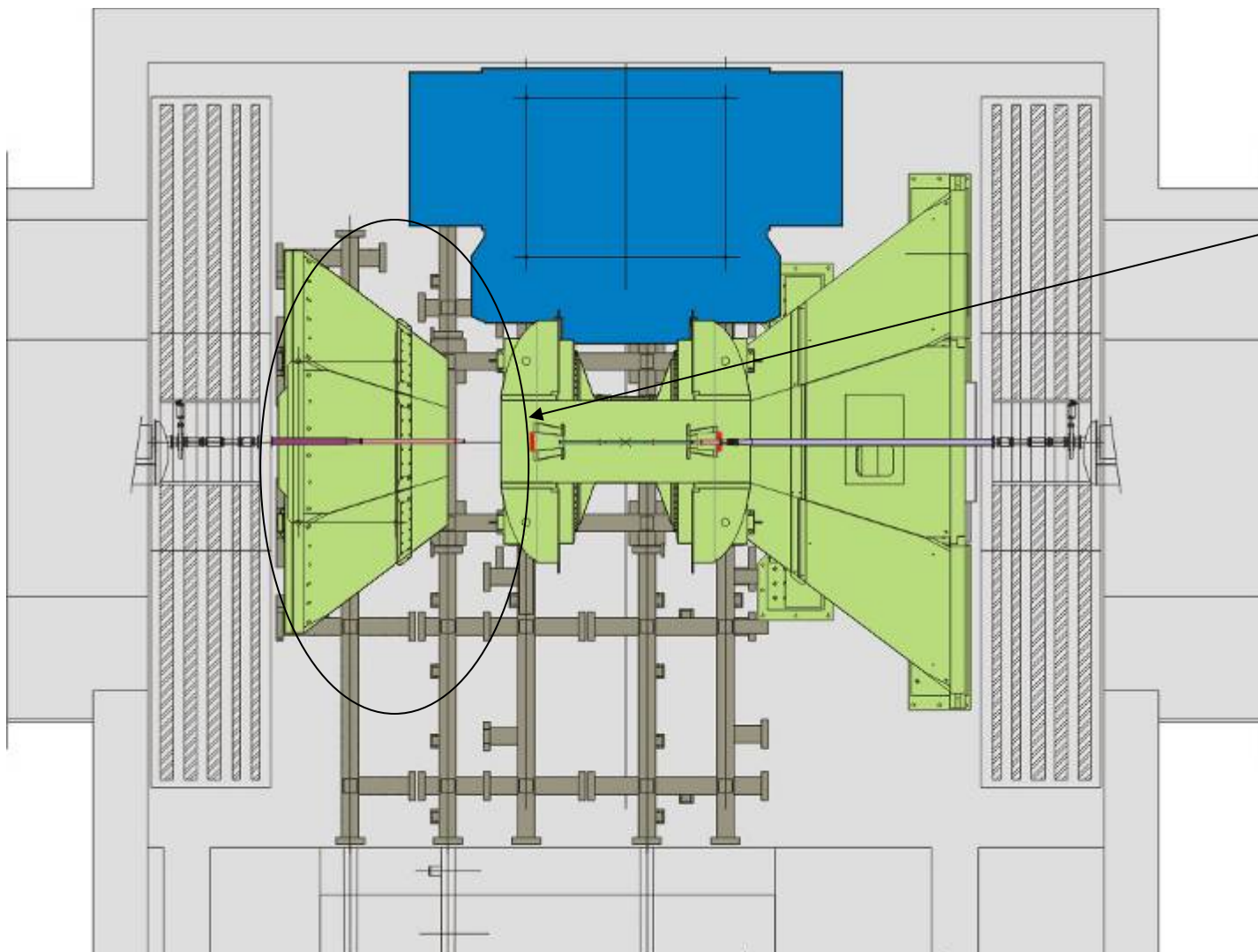
Step 1: Bleed up PHENIX beampipe to atmospheric pressure with dry nitrogen (CAD vacuum group). Move MMS and CM into Run position - Remove last section (5" spool) south of MMS.

Note: the MPC-Ex, MPC and BBC north and south detectors may be removed at any time before and up until they are noted to be removed in these choreography slides, as determined most convenient to the PHENIX R&R effort in general.



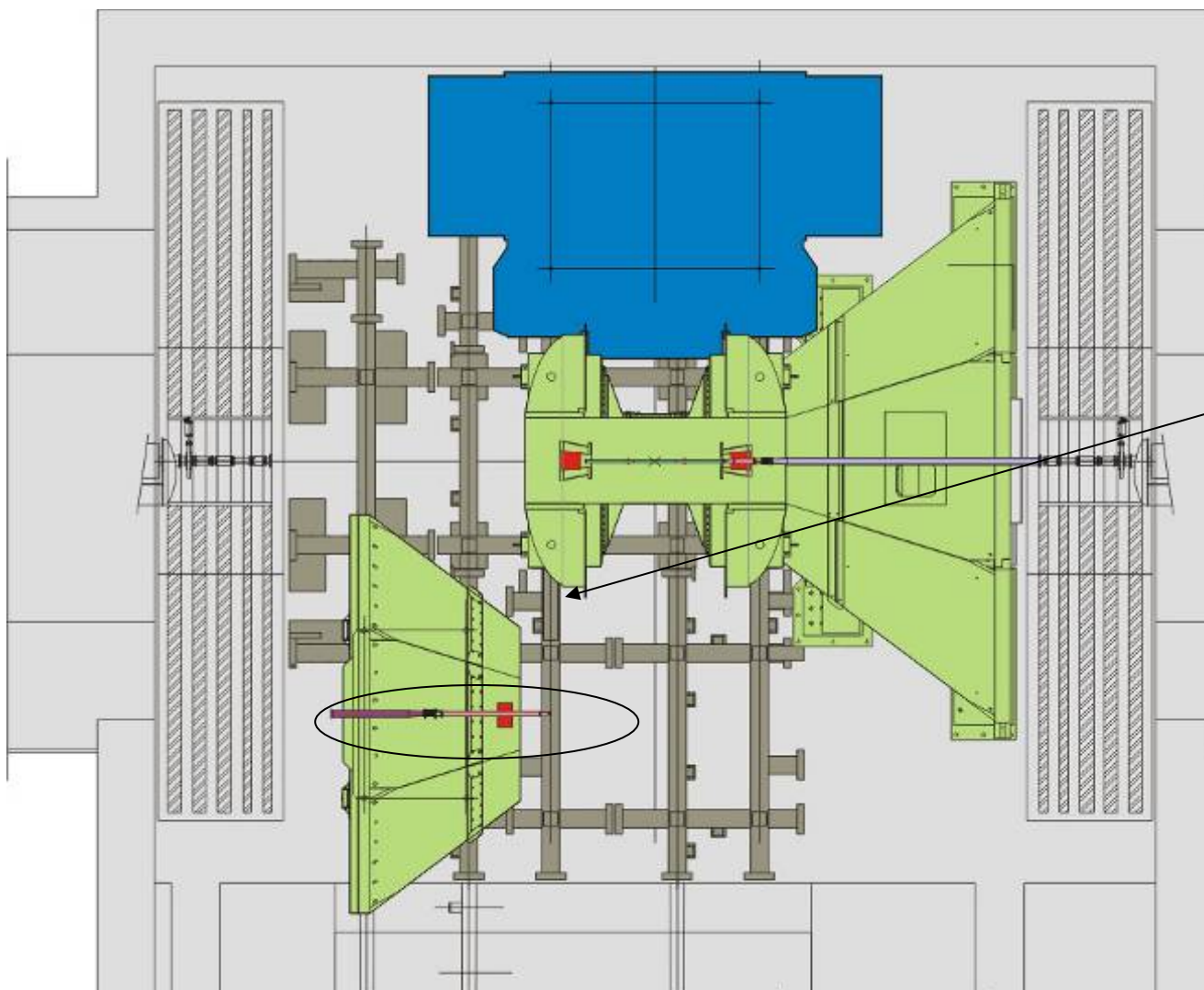
Step 2:

Move MMS and CM to South position. Remove MPC, MPC-Ex and BBC North detectors then detach 3" to 40 mm south transition from Be/Al central beampipe, making sure that central Be/Al beampipe is adequately supported at all times.



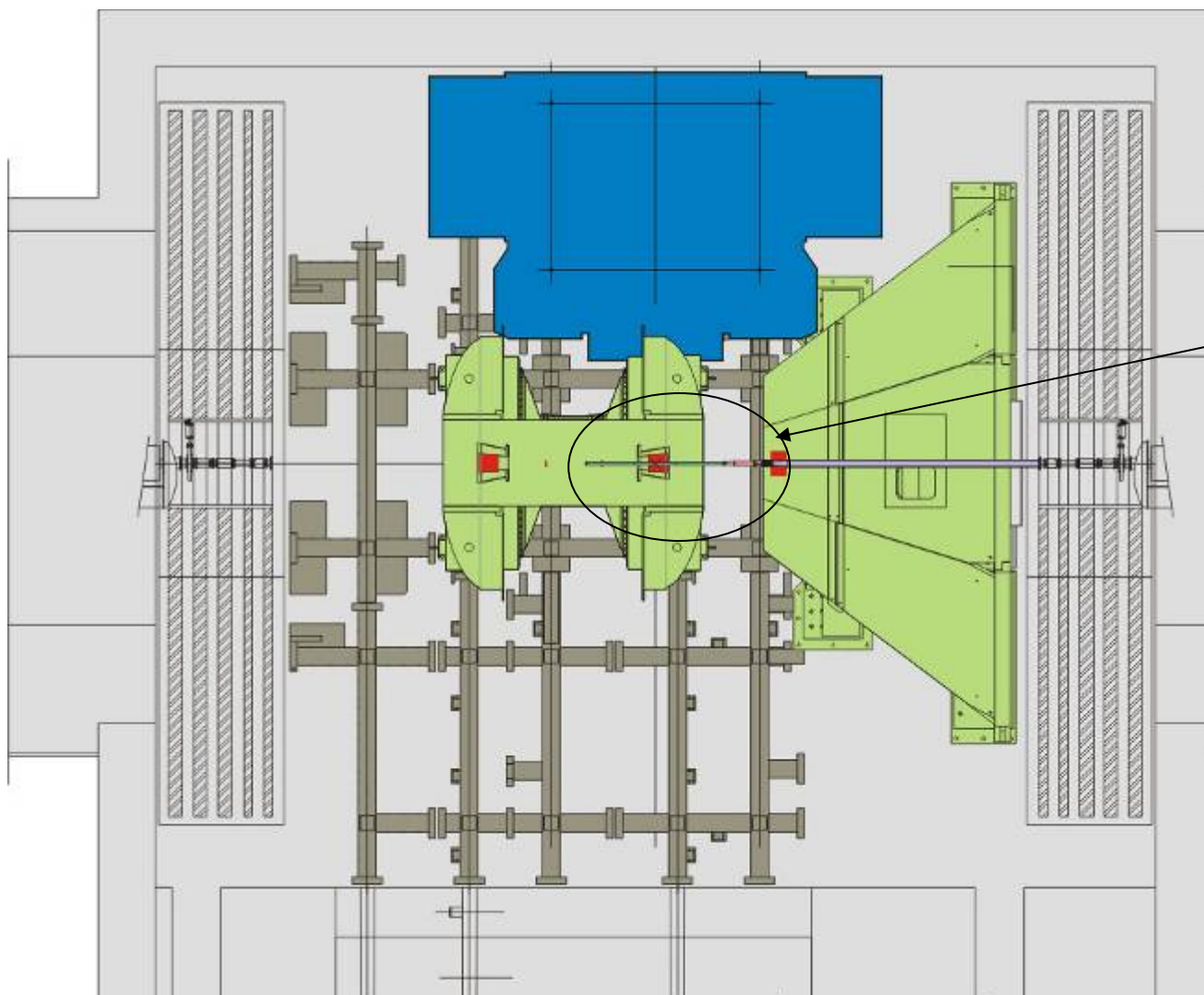
Step 3:

Move CM to run position with MMS still south then remove MPC-Ex, MPC and BBC South detectors. Move the south 3" to 40 mm transition beampipe, south 3" bellows and south 3" to 5" transitions into the MMS.



Step 4:

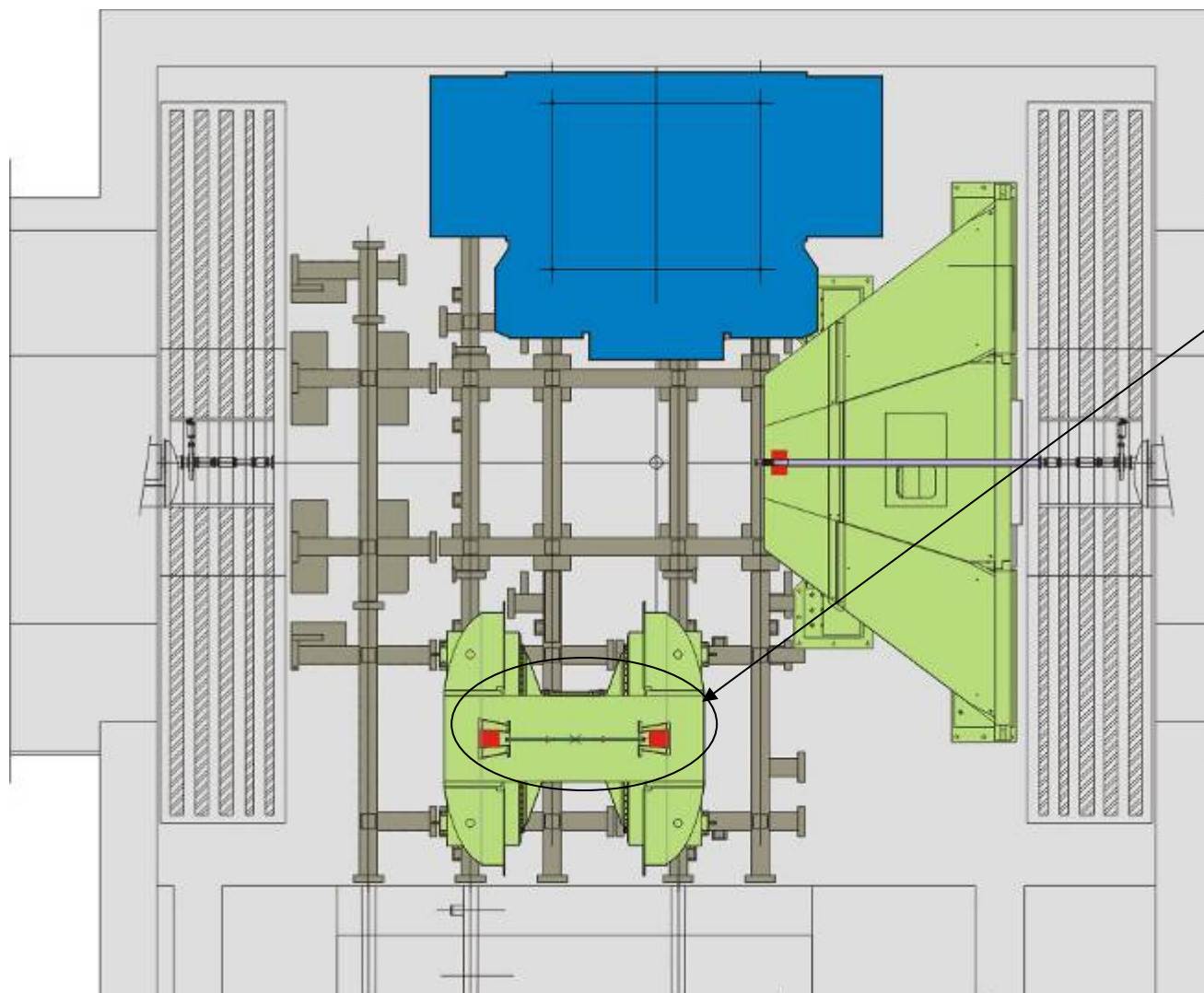
Move MMS into IR east area with south 40 mm to 3 " transition, south 3" bellows & 3" to 5" transition section inside the MMS. After clearing the CM these beampipe sections shall be removed disassembled, filled with dry nitrogen, capped and taken into storage by CAD vacuum group until needed for repurposing for sPHENIX.



Step 5:

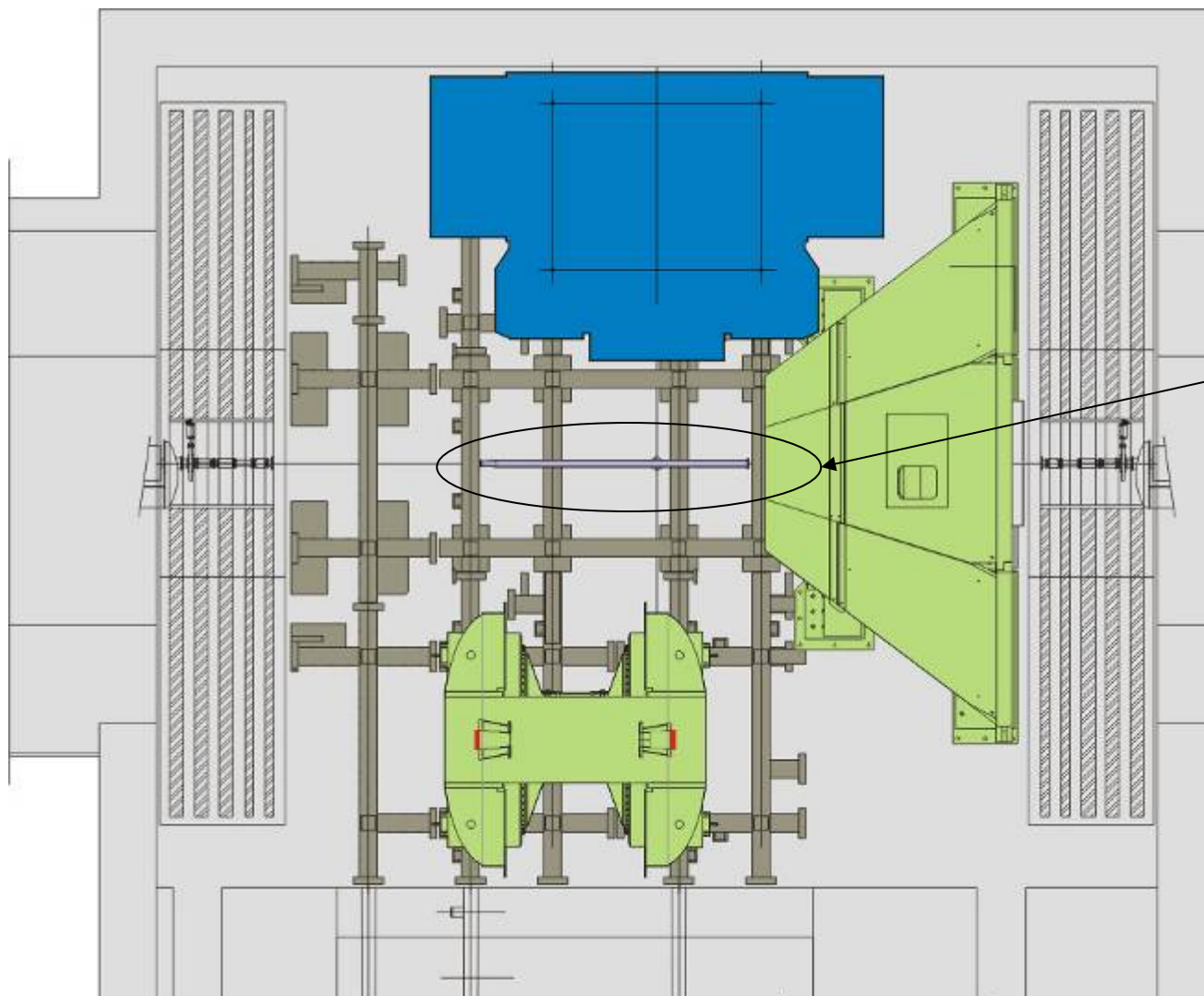
Move CM into alignment with rails to move the CM east. Remove north 3" bellows and north 40 mm to 3" transition sections, fill with dry nitrogen, cap and take into storage by CAD vacuum group until needed for repurposing for sPHENIX.

Slide Be/Al section south and make sure beampipe is adequately supported at all times.



Step 6:

Move CM (with Be/Al beampipe inside and adequately supported) east until NMM is cleared. Then remove Be/Al beampipe section, fill with dry nitrogen, cap and take into storage by CAD vacuum group until needed for repurposing for sPHENIX.



Step 7:

A PHENIX tech shall be in the square hole in the MuID detectors to detach the north 3" to 5" transition from the north 5" bellows, then remove north 3-5" transition beampipe, fill with dry nitrogen, cap and take into storage by CAD vacuum group until needed for repurposing for sPHENIX.

Vacuum Preparation and Testing

After the new beampipe, spool, transitions and bellows are all in place connected and pumped down to vacuum, the new sections shall be baked to 200°C (or such other temperature as determined by the CAD vacuum group) for a period to be determined by the CAD vacuum group.

After bakeout the entire temporary beampipe assembly shall be leak tested.

Final survey

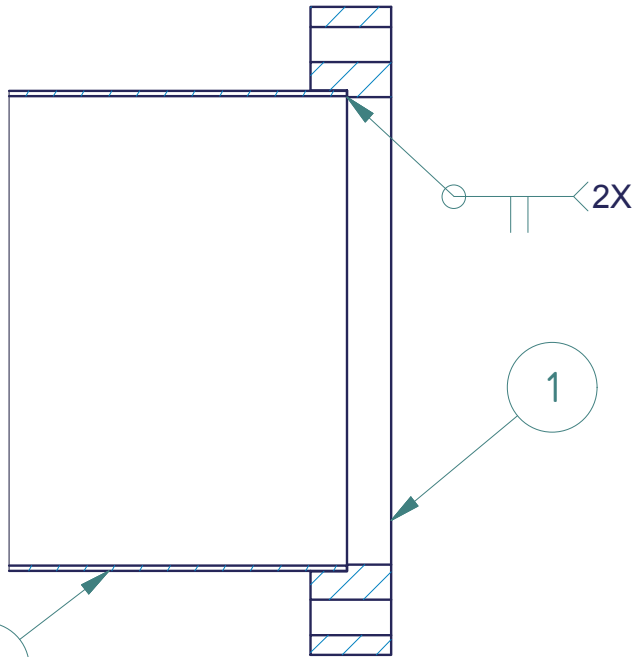
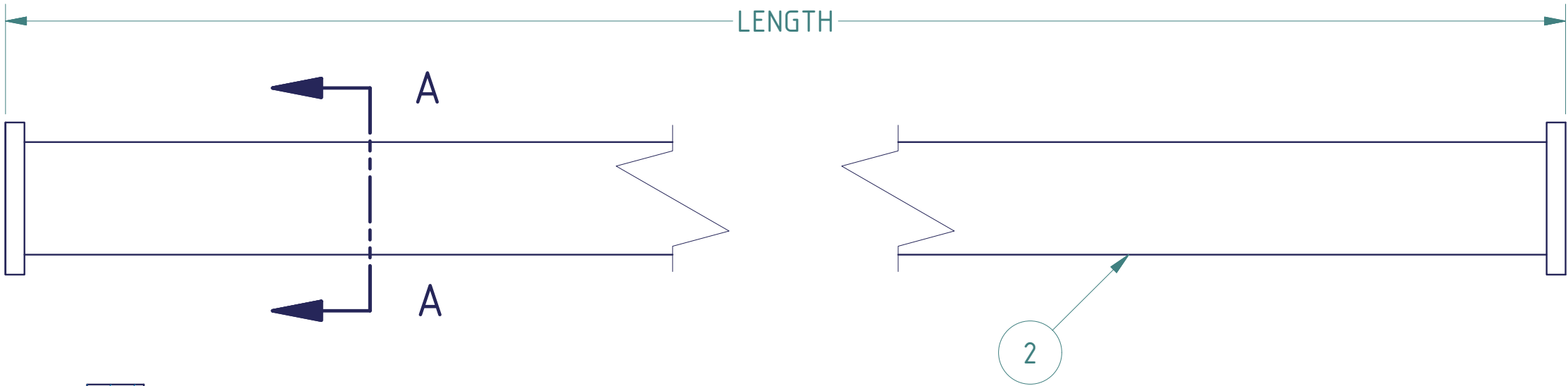
After all detectors have been re-installed a final BP survey shall be performed.

Installation of the new VTX detector may now begin.

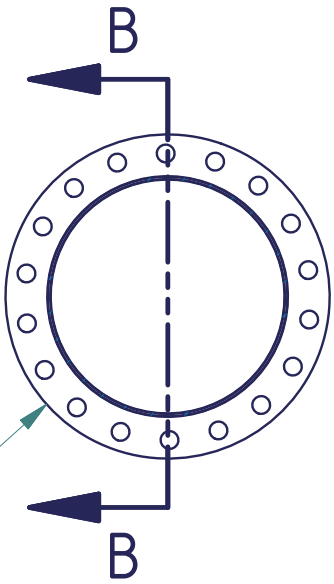
NOTES:

- CLEAN PART BEFORE WLDING, NO CLEANING AFTER WELDING. INTERNAL ARGON PURGE REQUIRED DURING WELDING
- WELD SHALL BE LEAK TIGHT TO EQUAL TO OR LESS THAN $1 \times (10)^{-11}$ STD. cc He/Sec. WHEN CHECKED WITH A HELIUM MASS SPECTROMETER WITH A SENSITIVITY OF $5 \times (10)^{-12}$ STD. cc He/Sec.
- TAG IN ACCORDANCE WITH MIL-STD-130

REVISION HISTORY			
REV	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE		



SECTION B-B
SCALE 1 / 2

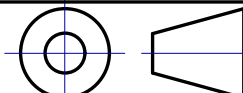


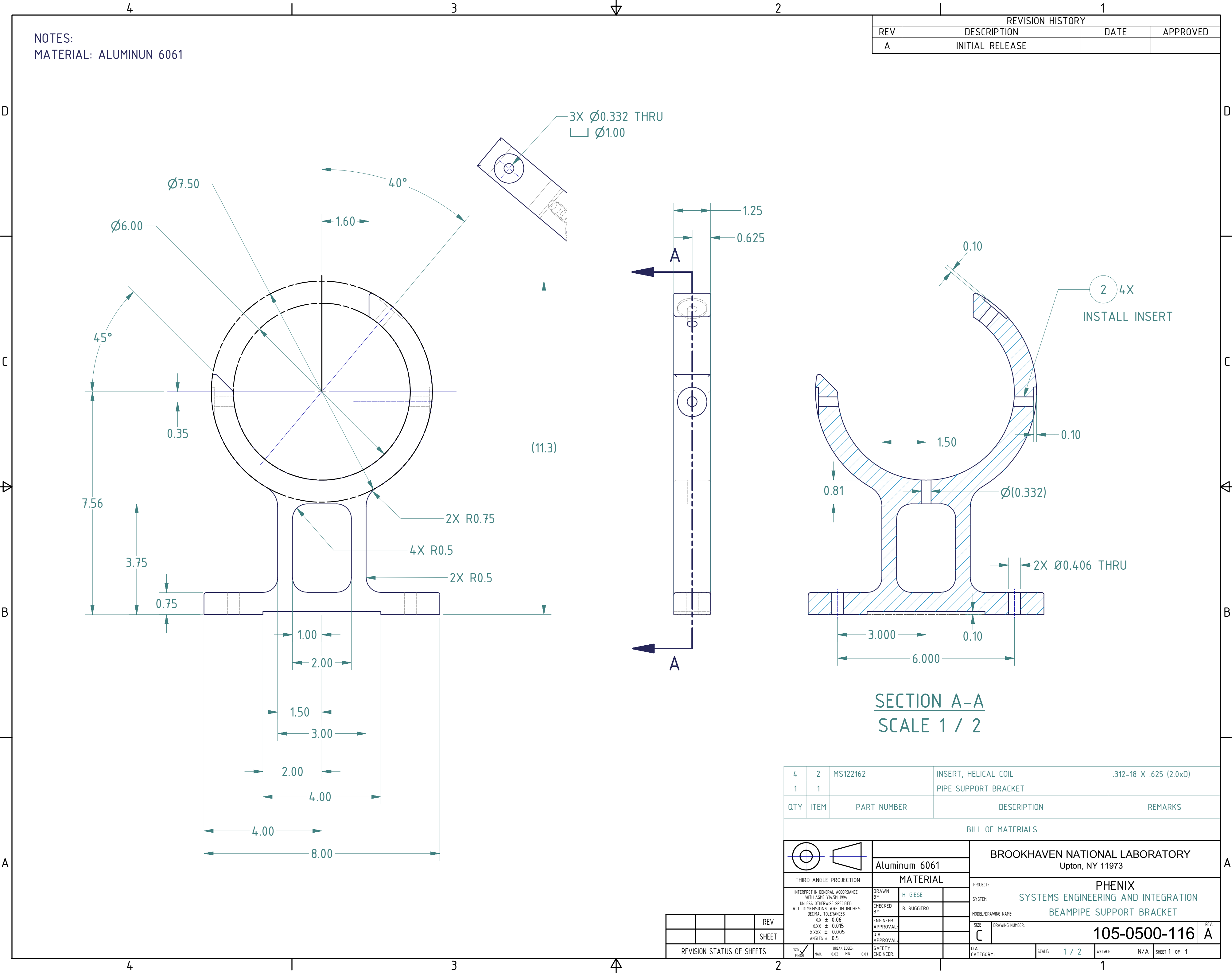
SECTION A-A
SCALE 1 / 4

PARTS LIST	
PT#	LENGTH
01	196.10
02	183.18

1	2		BEAM PIPE	5" STAINLESS, WALL THICKNESS .109"
6	1	130029	FLANGE, TAPPED	6.75" x 5", STAINLESS, MDC VACCUUM
QTY	ITEM	PART NUMBER	DESCRIPTION	REMARKS

BILL OF MATERIALS

		Stainless Steel		BROOKHAVEN NATIONAL LABORATORY Upton, NY 11973			
THIRD ANGLE PROJECTION		MATERIAL		PROJECT: PHENIX			
INTERPRET IN GENERAL ACCORDANCE WITH ASME Y14.5M-1994. UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS ARE IN INCHES DECIMAL TOLERANCES X.X ± 0.06 X.XX ± 0.015 X.XXX ± 0.005 ANGLES ± 0.5		DRAWN BY:	H. GIESE	SYSTEM: SYSTEMS ENGINEERING AND INTEGRATION			
		CHECKED BY:	R. RUGGIERO	MODEL/DRAWING NAME: TEMPORARY BEAMPIPE			
		ENGINEER APPROVAL:		SIZE: B	DRAWING NUMBER: 105-0500-114	REV. A	
		Q.A. APPROVAL:					
12S <input checked="" type="checkbox"/> FINISH	MAX. 0.03	BREAK EDGES: MIN. 0.01	SAFETY ENGINEER:	Q.A. CATEGORY:	SCALE: 1 / 6	WEIGHT:	SHEET 1 OF 1



NOTES:
MATERIAL: ALUMINUM 6061

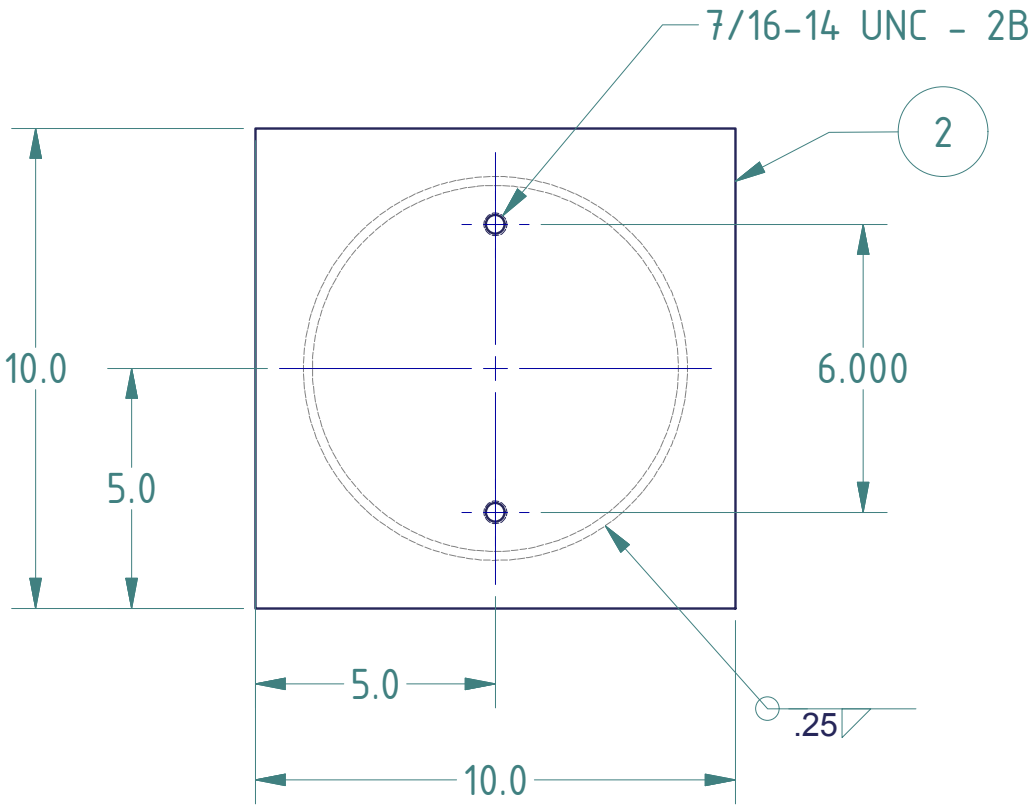
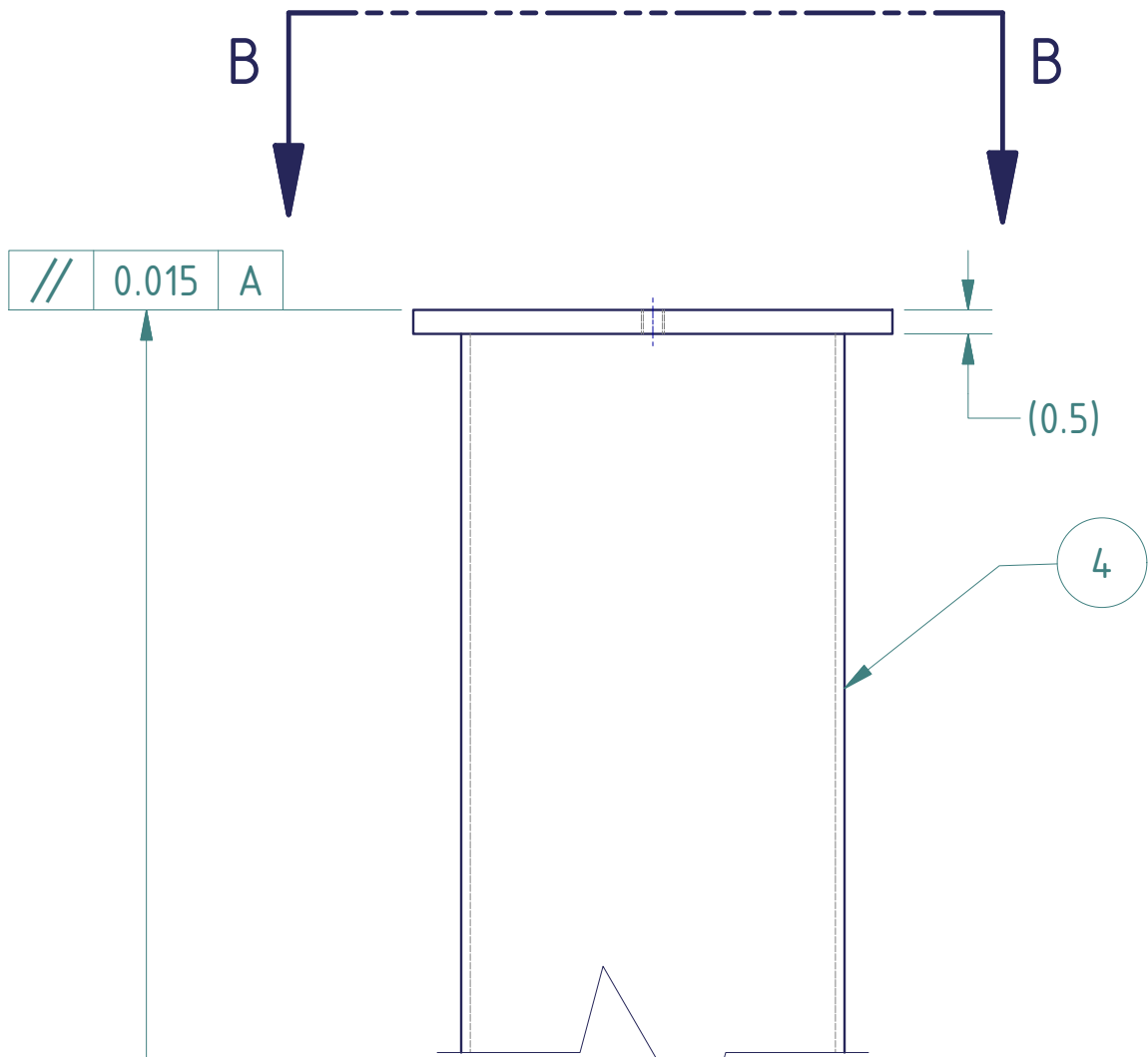
REVISION HISTORY			
REV	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE		

SECTION A-A
SCALE 1 / 2

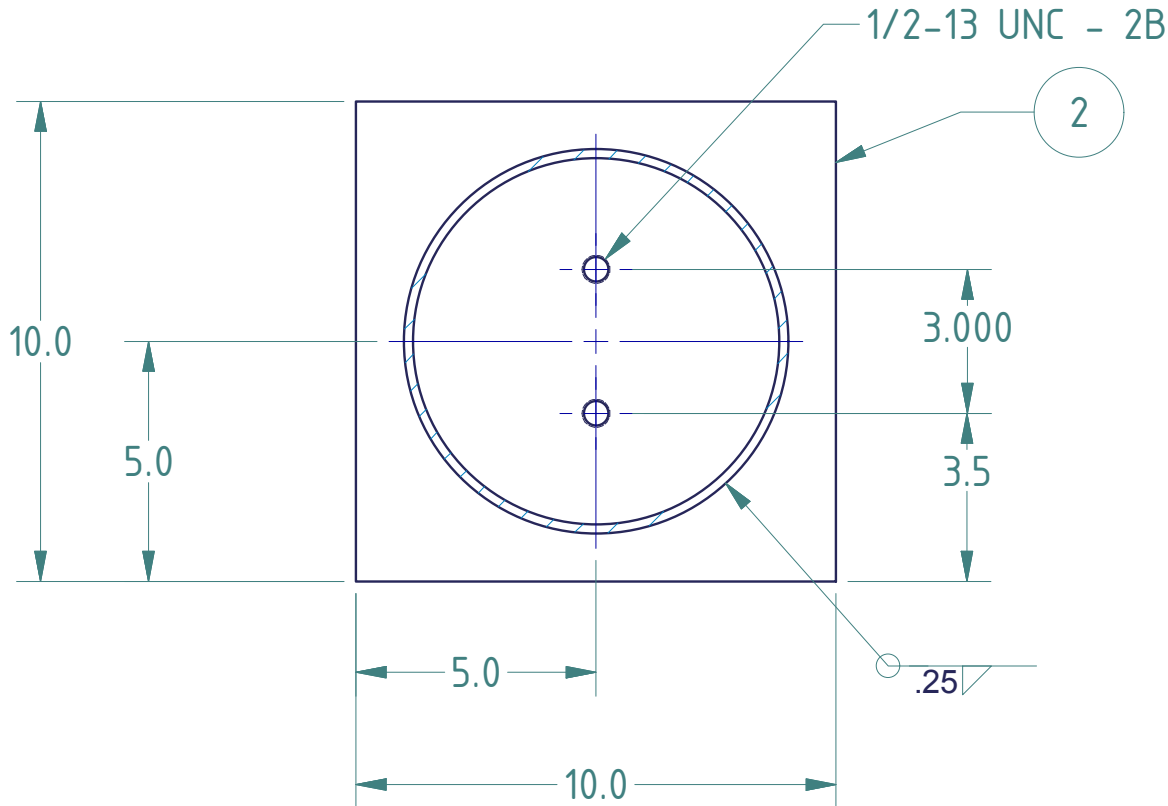
4	2	MS122162	INSERT, HELICAL COIL	.312-18 X .625 (2.0xD)
1	1		PIPE SUPPORT BRACKET	
QTY	ITEM	PART NUMBER	DESCRIPTION	REMARKS
BILL OF MATERIALS				
			BROOKHAVEN NATIONAL LABORATORY Upton, NY 11973	
			PROJECT: PHENIX SYSTEM: SYSTEMS ENGINEERING AND INTEGRATION MODEL/DRAWING NAME: BEAMPIPE SUPPORT BRACKET	
			SIZE: C	DRAWING NUMBER: 105-0500-116
			Q.A. CATEGORY:	SCALE: 1 / 2
			WEIGHT: N/A	SHEET 1 OF 1

NOTES:
1. SEPARATE STAND WELDMENTS DIFFER ONLY IN THE DRILLED HOLES AT THE TOP (SEE PARTS LIST)
2. NO HELICAL INSERTS NEEDED FOR STANDS WITH ROLLER ATTACHMENT
MATERIAL: ALUMINUM 6061

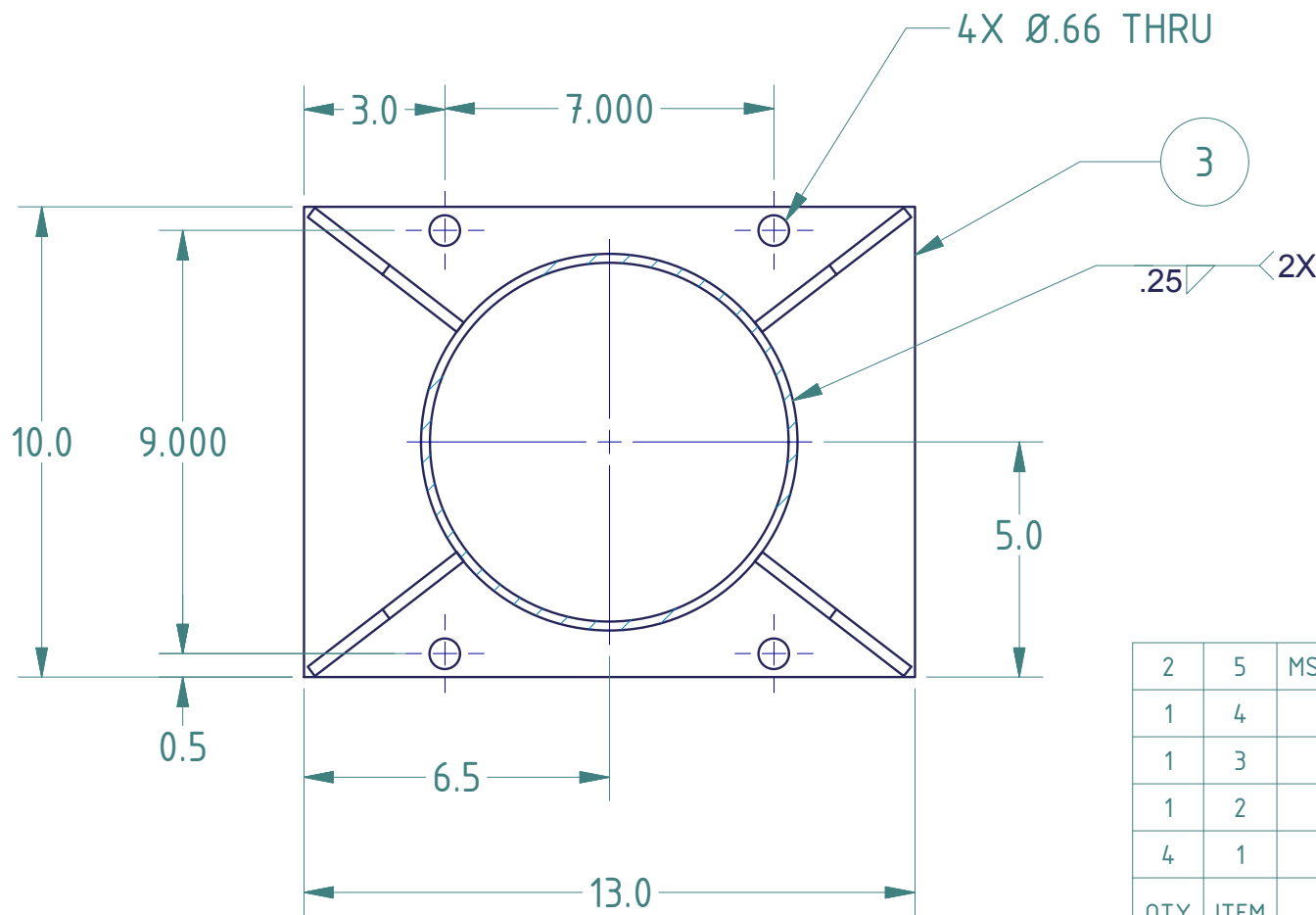
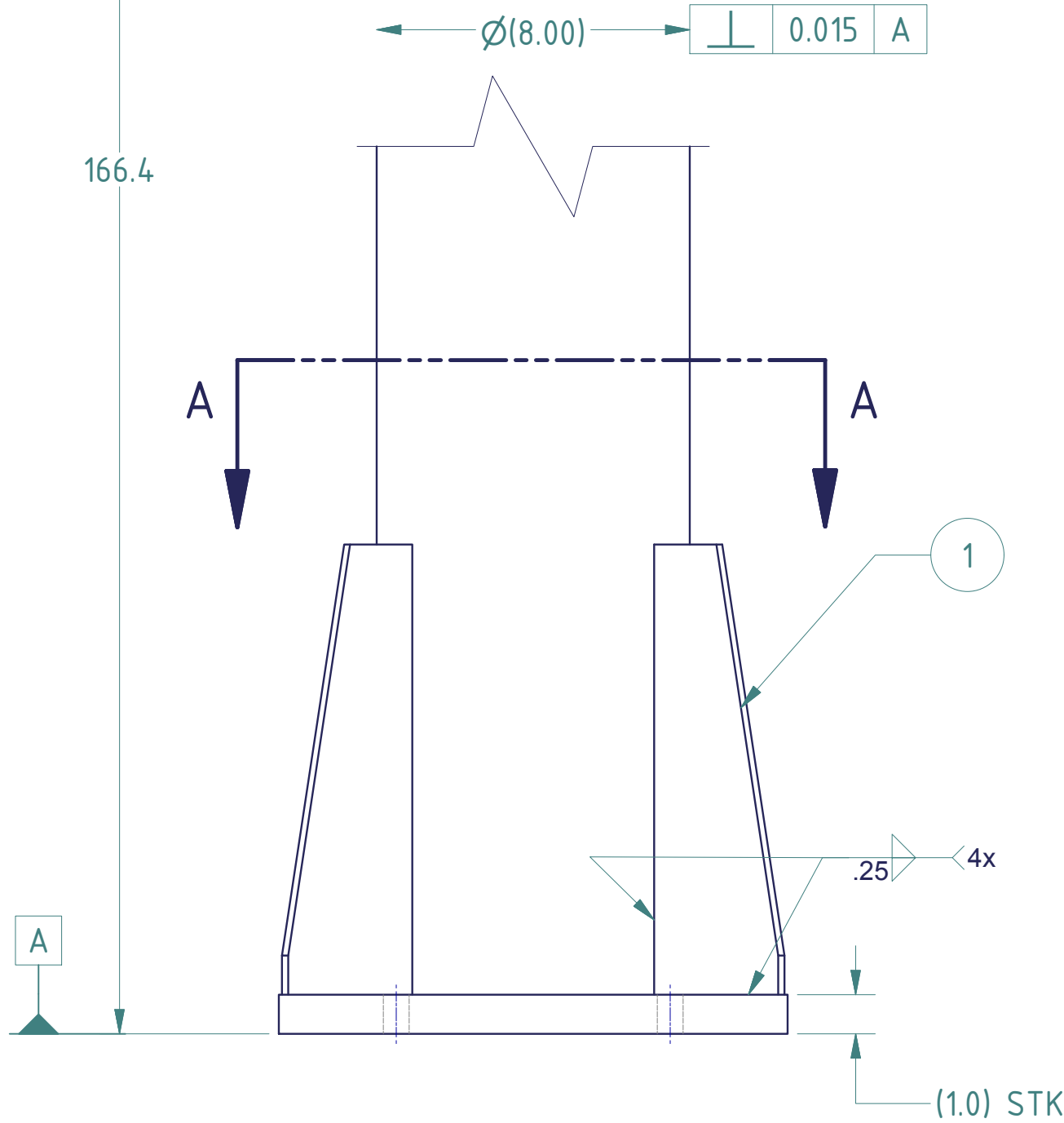
REVISION HISTORY			
REV	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE		



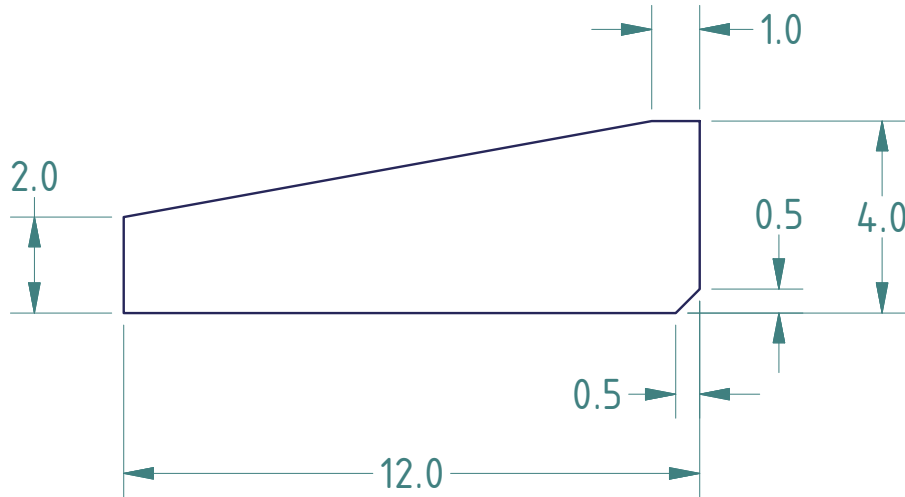
PT#-01
VIEW B-B
SCALE 1 / 4



PT#-02
SECTION B-B
SCALE 1 / 4



SECTION A-A
SCALE 1 / 4



DETAIL ITEM 1

PARTS LIST	
PT#	SUPPORT TYP
01	BRACKET
02	ROLLER

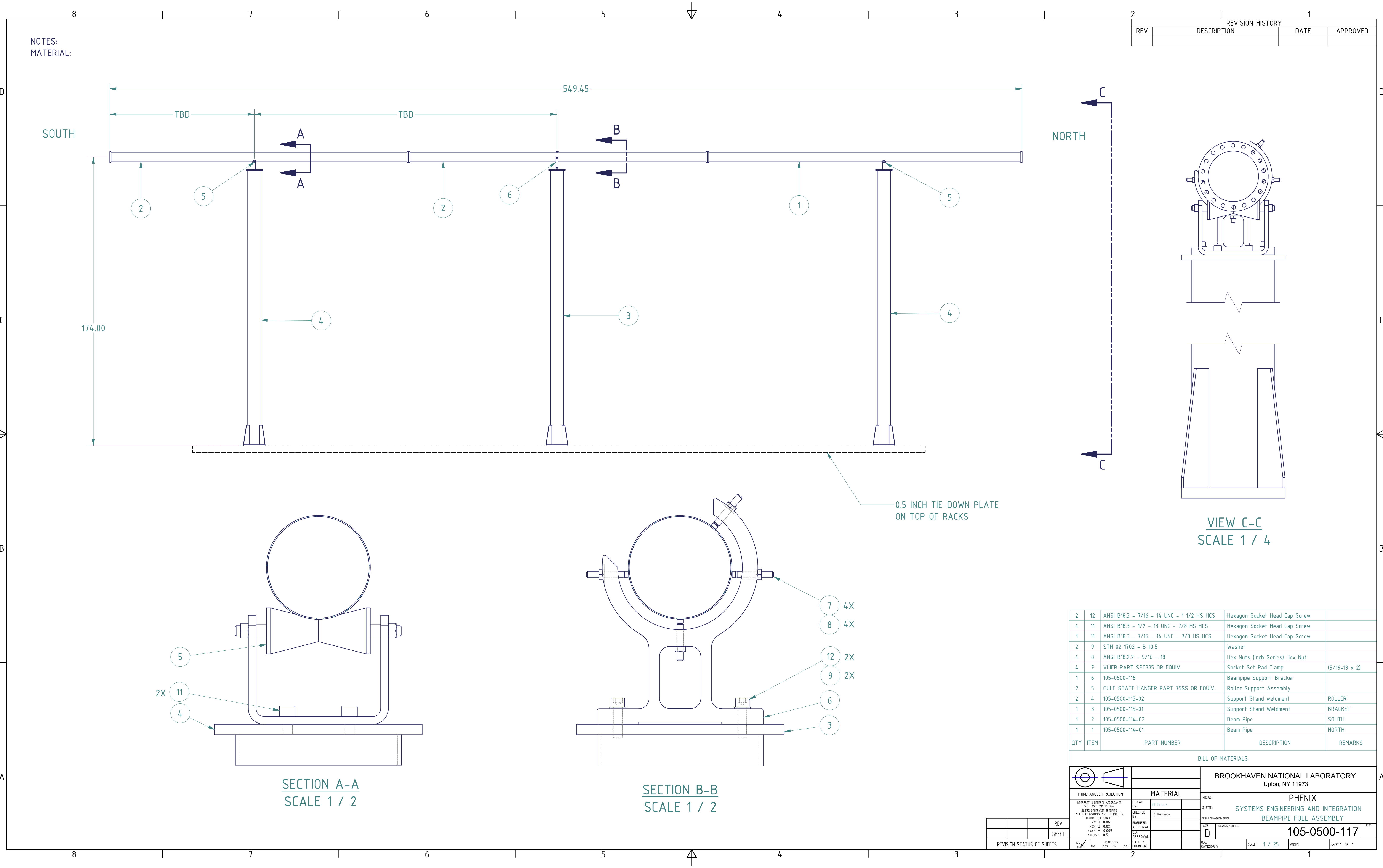
QTY	ITEM	PART NUMBER	DESCRIPTION	REMARKS
2	5	MS122123	INSERT, HELICAL COIL	.375-16 X .56
1	4		TUBING, 8.0 O.D. X .375 WALL	ALUM, TYPE 6061-T6
1	3		PLATE, 1.0 THK.	ALUM, TYPE 6061-T6
1	2		PLATE, .5 THK.	ALUM, TYPE 6061-T6
4	1		PLATE, .25 THK.	ALUM, TYPE 6061-T6

BILL OF MATERIALS

THIRD ANGLE PROJECTION		Aluminum 6061		BROOKHAVEN NATIONAL LABORATORY Upton, NY 11973	
INTERPRET IN GENERAL ACCORDANCE WITH ASME Y14.5M-1994. UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS ARE IN INCHES. DECIMAL TOLERANCES: .XX ± 0.06, .XXX ± 0.02, .XXXX ± 0.005, ANGLES ± 0.5.		DRAWN BY: H. GIESE	6/27/2016	PROJECT: PHENIX	
		CHECKED BY: R. Ruggiero		SYSTEM: SYSTEMS ENGINEERING AND INTEGRATION	
		ENGINEER APPROVAL:		MODEL/DRAWING NAME: SUPPORT STAND WELDMENT	
		Q.A. APPROVAL:		SIZE: C	
		SAFETY ENGINEER:		DRAWING NUMBER: 105-0500-115	
				REV: A	
				Q.A. CATEGORY:	
				SCALE: 1 / 4	
				WEIGHT: N/A	
				SHEET 1 OF 1	

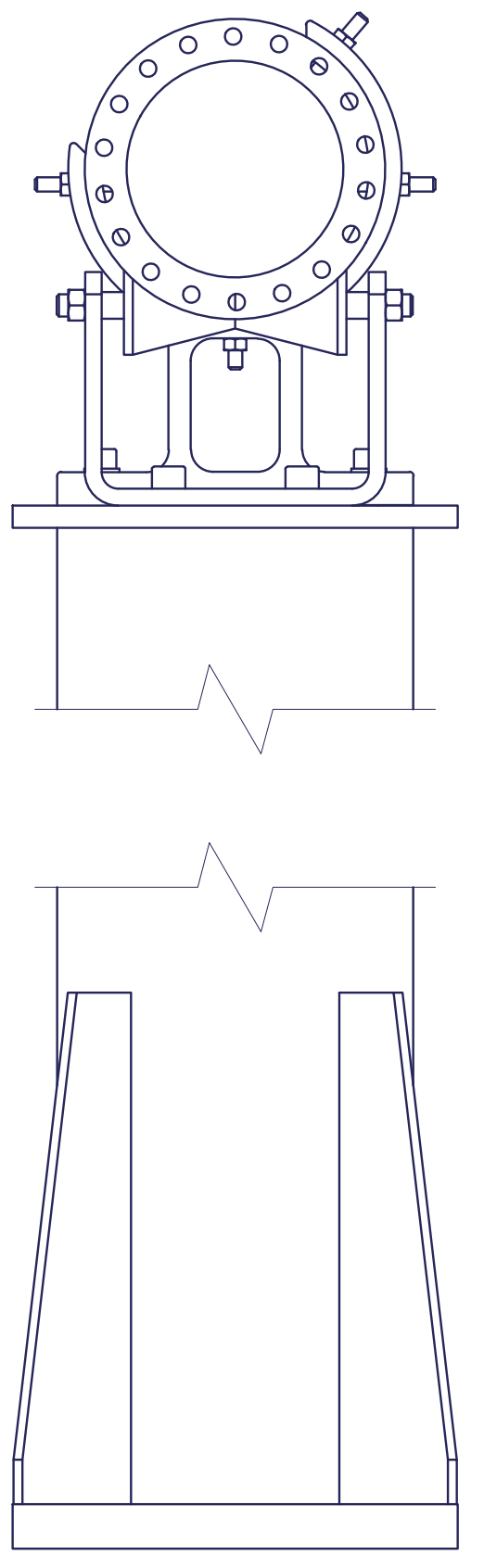
REV	SHEET

REVISION STATUS OF SHEETS

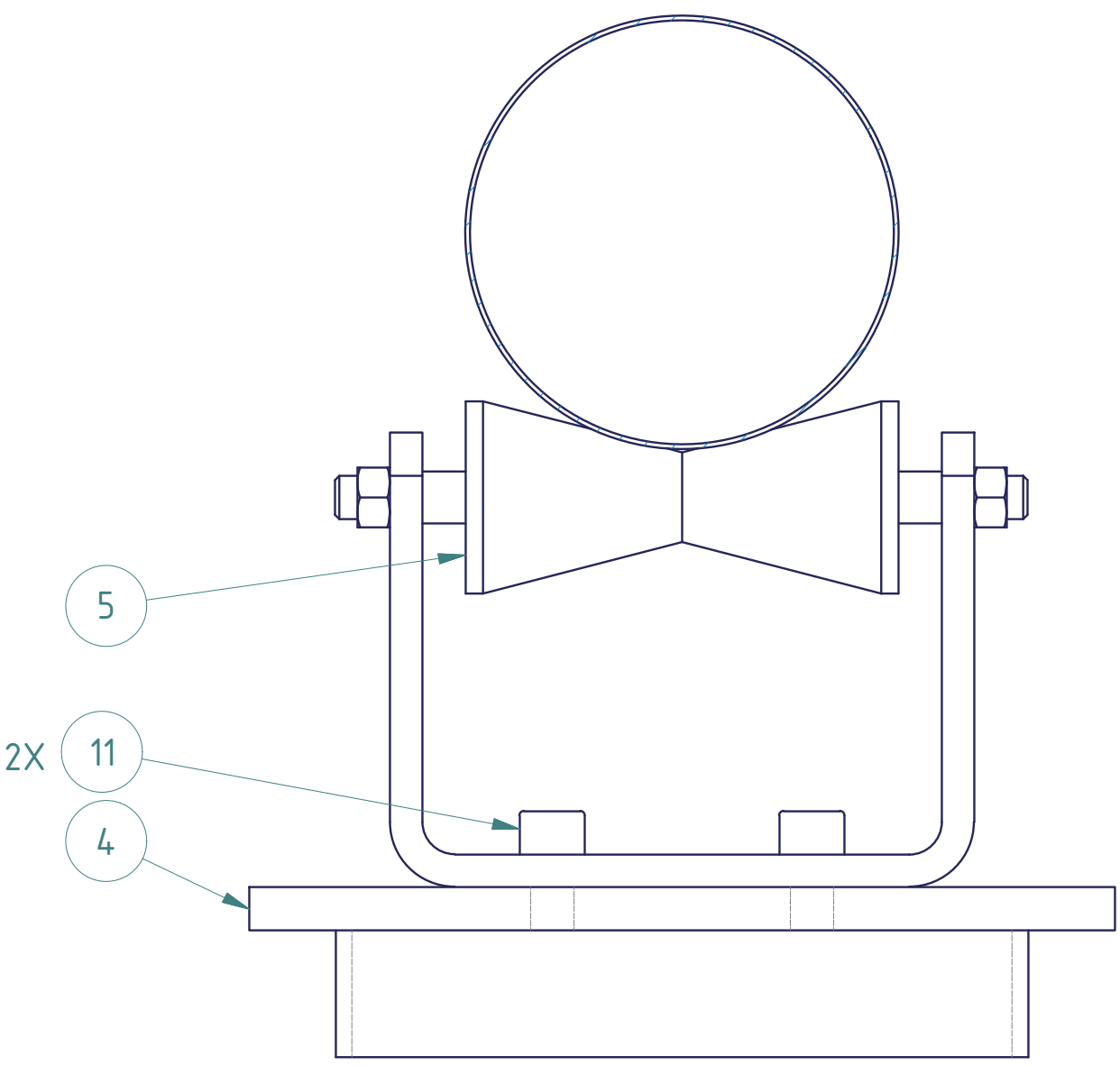


NOTES:
MATERIAL:

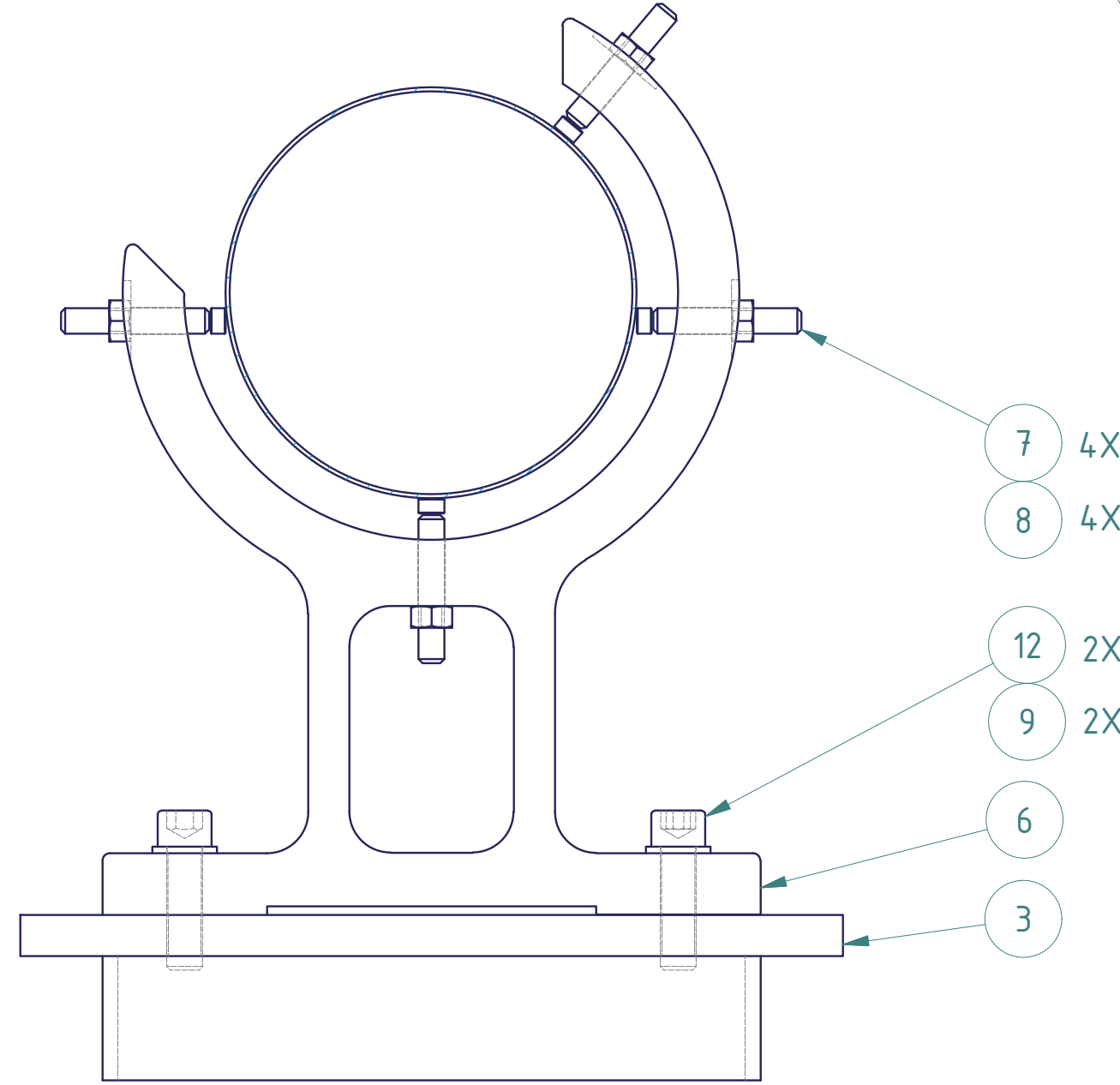
REVISION HISTORY			
REV	DESCRIPTION	DATE	APPROVED



VIEW C-C
SCALE 1 / 4



SECTION A-A
SCALE 1 / 2



SECTION B-B
SCALE 1 / 2

QTY	ITEM	PART NUMBER	DESCRIPTION	REMARKS
2	12	ANSI B18.3 - 7/16 - 14 UNC - 1 1/2 HS HCS	Hexagon Socket Head Cap Screw	
4	11	ANSI B18.3 - 1/2 - 13 UNC - 7/8 HS HCS	Hexagon Socket Head Cap Screw	
1	11	ANSI B18.3 - 7/16 - 14 UNC - 7/8 HS HCS	Hexagon Socket Head Cap Screw	
2	9	STN 02 1702 - B 10.5	Washer	
4	8	ANSI B18.2.2 - 5/16 - 18	Hex Nuts (Inch Series) Hex Nut	
4	7	VLIER PART SSC335 OR EQUIV.	Socket Set Pad Clamp	(5/16-18 x 2)
1	6	105-0500-116	Beam Pipe Support Bracket	
2	5	GULF STATE HANGER PART 75SS OR EQUIV.	Roller Support Assembly	
2	4	105-0500-115-02	Support Stand weldment	ROLLER
1	3	105-0500-115-01	Support Stand Weldment	BRACKET
1	2	105-0500-114-02	Beam Pipe	SOUTH
1	1	105-0500-114-01	Beam Pipe	NORTH

BILL OF MATERIALS

		BROOKHAVEN NATIONAL LABORATORY Upton, NY 11973	
THIRD ANGLE PROJECTION INTERPRET IN GENERAL ACCORDANCE WITH ASME Y14.5-1994 UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES DECIMAL TOLERANCES XX ± 0.06 XXX ± 0.02 XXXX ± 0.005 ANGLES ± 0.5		PROJECT: SYSTEM: MODEL/DRAWING NAME: REV: D DRAWING NUMBER: 105-0500-117	
DRAWN BY: H. Giese CHECKED BY: R. Ruggiero ENGINEER APPROVAL: SAFETY ENGINEER:		SCALE: 1 / 25 WEIGHT: SHEET 1 OF 1	

REV	DESCRIPTION	DATE	APPROVED